AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

JANUARY 15, 1951

In This Issue . . .

Outlook for the Automobile Industry

Warplane Production Target

Buick and Plymouth Improvements

Tractor Demand for This Year

Analysis of Vehicle Heating Problems

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A CHILTON PUBLICATION

new DOUBLE DUTY machine does internal and face grinding SIMULTANEOUSLY!

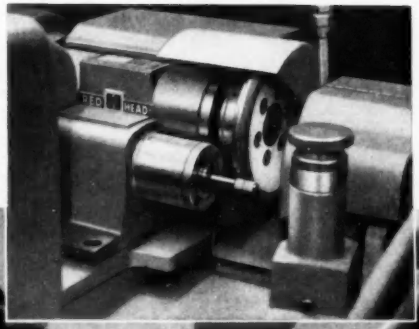
Roller production increased 35% with new Heald Size-Matic Internal arranged for simultaneous bore and face grinding

This unusual grinding application is a typical example of the versatility of Heald machines. A unique wheelhead arrangement permits the new Model 171 Size-Matic Internal to perform bore grinding and facing operations simultaneously—in the same time normally required for bore grinding alone. Savings in handling and cycling time boosted production by 35%.

The face grinding wheelhead, mounted on the wheelslide adjacent to the bore grinding wheelhead, is designed with enough free axial motion to permit the facing wheel to maintain a fixed position while the bore grinding wheel reciprocates. A coil spring holds the facing wheel against the hydraulically operated automatic facing stop.

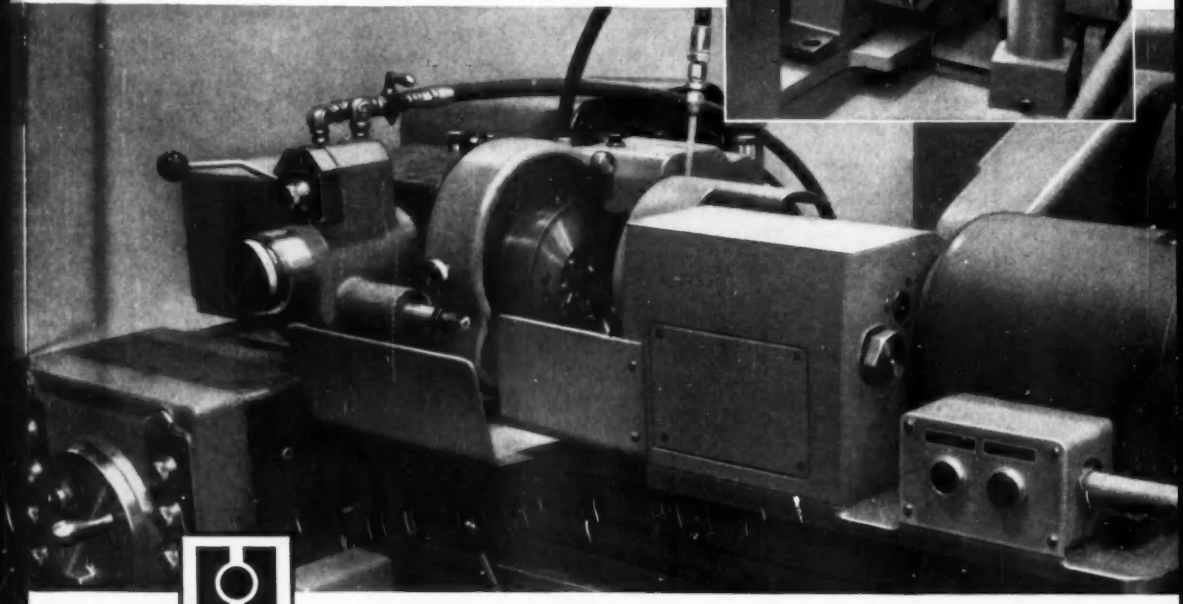
The facing operation is performed during the roughing part of the bore grinding cycle. During finish bore grinding, the facing wheel is automatically retracted, and can be dressed during this operation with no delay to the grinding cycle.

In addition to saving valuable time, this set up produces a ground face that is always perfectly square with the bore.



Close-up view from rear of machine, showing unique arrangement of bore and face grinding wheelheads.

The new Heald Model 171 Size-Matic shown below grinds face and I.D. of rollers simultaneously, reducing cycle and handling time by 35%.



HEALD

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

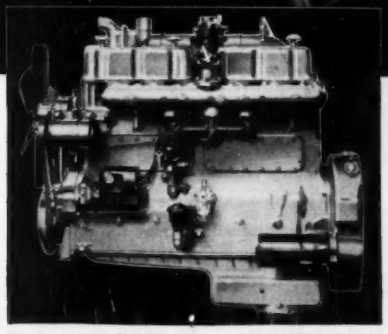
Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

New York Daily News Photo
Courtesy
Taylor M. Ward, Inc.,
Ithaca, N. Y.

WAUKESHA-powered

WARD LA FRANCE

equipment is right on the job!



Waukesha 145-GKB High Output FIRE ENGINE SPECIAL
Six cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement develops 240 hp. at 2400 rpm.

IN THE NATION'S LARGEST CITY this speedy, powerful Waukesha-engined Ward LaFrance pumper is but one of nearly a hundred similar vehicles in use by the N.Y.F.D. Here protection depends on pumper performance. And Waukesha power provides that dependability. The pumper you see here is a 240 H.P., 1250 G.P.M., 150 P.S.I. Ward LaFrance Type 150-T, with rugged pumps, and a Waukesha 145-GKB High Output Fire Engine Special for a quick start, a fast run, and to put plenty of power behind those pumps. More than thirty years of fire apparatus manufacturing experience have demonstrated to Ward LaFrance the value of standardizing on Waukesha Engines for high speed power and dependable performance. *Get Bulletin 1553.*

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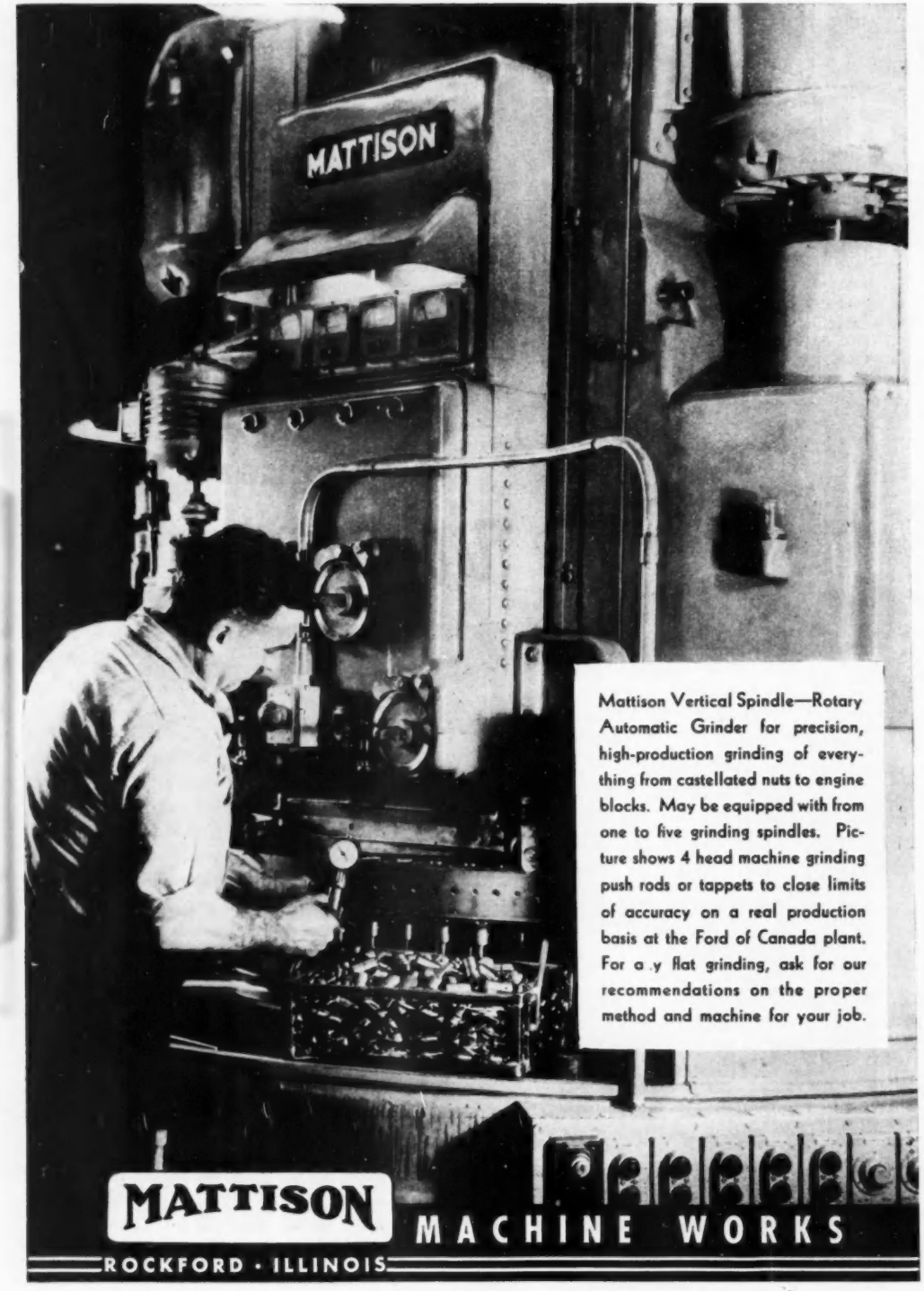
WAUKESHA ENGINES

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK LOS ANGELES



Mattison Vertical Spindle—Rotary Automatic Grinder for precision, high-production grinding of everything from castellated nuts to engine blocks. May be equipped with from one to five grinding spindles. Picture shows 4 head machine grinding push rods or tappets to close limits of accuracy on a real production basis at the Ford of Canada plant. For a .y flat grinding, ask for our recommendations on the proper method and machine for your job.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

Jan. 15, 1951 Vol. 104, No. 2

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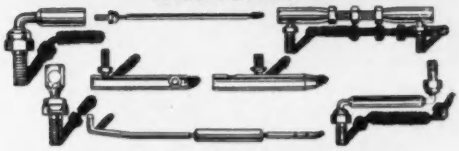
AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1902; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

TOUREK

BALL JOINTS, PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS

BALL JOINTS



Tourek's quality Ball Joints meet exacting requirements. Simplified design, improved performance, and lower costs result from specifying Tourek Ball Joints... the only recognized standard. Large stocks assure prompt delivery.

PIPE PLUGS

Tourek's precision countersunk steel pipe plugs are accurate, high strength, and economical—resulting in the highest quality at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: ¼", ⅜", ½", ¾" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2⅝" diameter.

SCREW MACHINE PRODUCTS

Modern high-speed single and 6-spindle automatics—together with complete secondary equipment, including grinding and brazing—plus 30 years' experience, assure you "The Best in Quality Screw Machine Products."

Your requirements, up to 2⅝", are made with utmost precision, and with promptest delivery assurances.

LITERATURE—Comprehensive data on any or all Tourek products sent promptly upon request. Write for yours now. J. J. TOUREK MFG. CO., 4701 West 16th St., Chicago 50, Illinois.

TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

ESTABLISHED IN 1920

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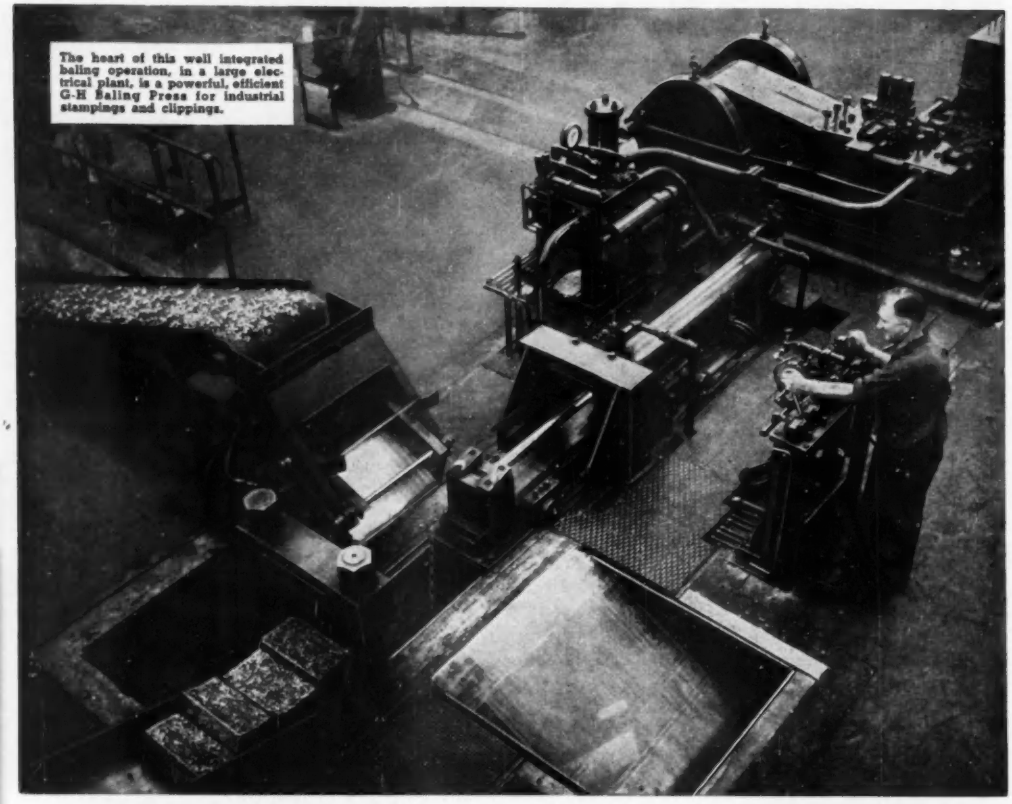

The heart of this well integrated baling operation, in a large electrical plant, is a powerful, efficient G-H Baling Press for industrial stampings and clippings.

BALING *Sheet Metal* SCRAP PAYS Multiple Dividends...

The experience of hundreds of metal working and metal producing plants proves that the baling of industrial stampings and clippings ... ferrous and non-ferrous ... pays dividends in many ways. Here are a few of the benefits:

- It helps to establish an orderly, integrated scrap salvage program.
- Baled sheet metal scrap, properly classified, consistently commands higher market prices ... yields a bigger return.
- Baled sheet metal scrap is valuable "raw material" in the production of new metal ... sheets, strip, bar stock, ingots ... even castings.
- As "raw material" it contributes to the conservation of natural resources ... and to lower material costs.

If your plant generates a sufficient volume of sheet metal scrap, you can realize multiple dividends by investing in the right size and type of baling press. GALLAND-HENNING builds powerful hydraulic balers in a range of sizes and capacities for every industrial need. For competent counsel on the Profitable Baling of your Sheet Metal Scrap, write ...

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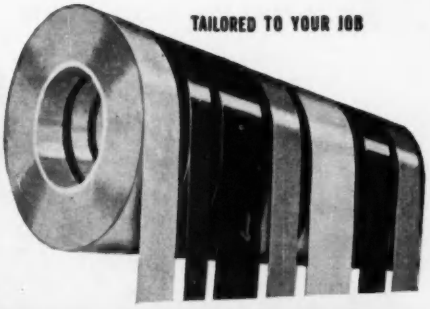
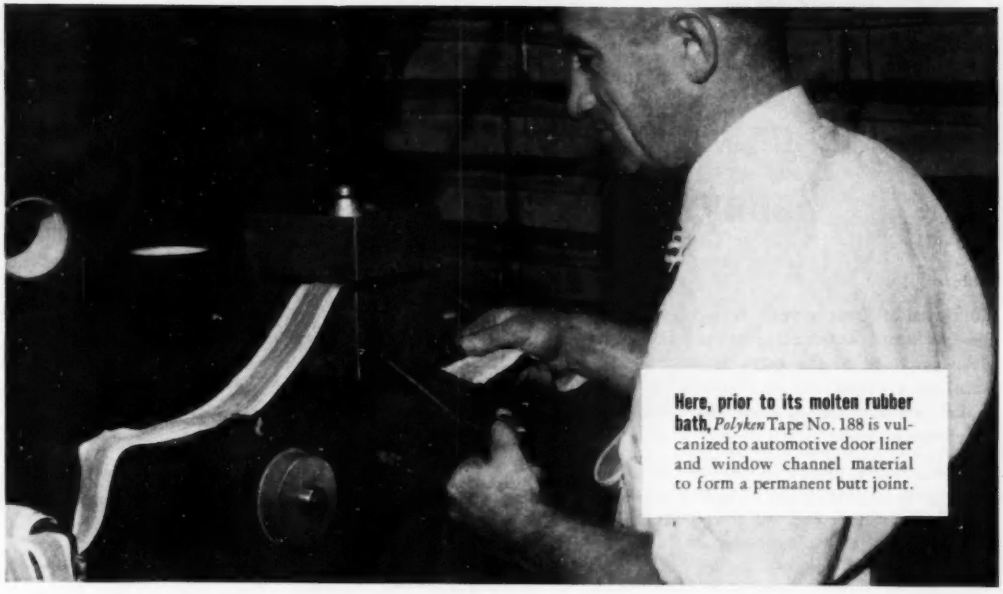
THE NEW

Polyken®

INDUSTRIAL TAPES

TAILORED TO YOUR JOB





Here, prior to its molten rubber bath, *Polyken* Tape No. 188 is vulcanized to automotive door liner and window channel material to form a permanent butt joint.

No "ifs" or "ands" about these butts

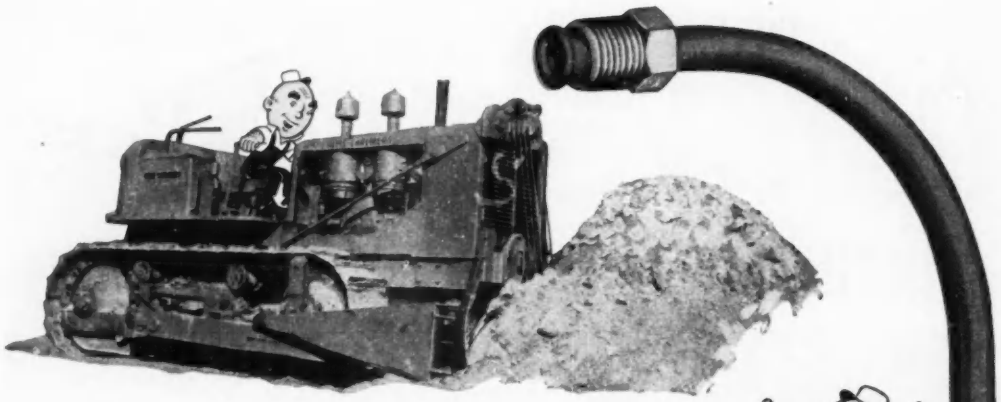
Butt-splicing is just one of the jobs that the automotive industry is finding for the new *Polyken* Industrial Tape, No. 188. But it's a tough job and it demonstrates the bull-dog tenacity of this amazing tape. Come hot, cold, moisture, or even a bath in molten rubber, No. 188 *sticks* and stays stuck.

Take the case of Schlegel Manufacturing Company. They needed a tape for butt-splicing together 100-yard lengths of woven material, to be coated with hot rubber for automotive door liners and window channel stripping. Ordinary tapes were too bulky, and wouldn't stay stuck during the hot rubber treatment.

Polyken engineers suggested they test the new No. 188 . . . and they've been using it ever since! Although it's only 11.5 mils thick, *Polyken* No. 188 has a tensile strength of 50 pounds per square inch. Its special thermo-setting adhesive actually holds tighter under extremes of heat! Sticks to any surface as well as its own, and easily conforms to rough and irregular shapes.

FREE SAMPLES. Write now for complete specification and engineering data, plus samples of *Polyken* No. 188. Address *Polyken*, Dept. AIA, 222 West Adams Street, Chicago 6, Illinois.

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company



Strong as an ox in bulldozers, too...
Bundyweld Tubing

Naturally!

Bundyweld's twenty-year record as the *preferred* automotive tubing is clear evidence of the extra strength it brings to fuel, oil, and hydraulic brake line systems of your heavier duty jobs as well.

The only tubing double-walled from a single strip, thinner-walled Bundyweld is brazed through 360° of wall contact. It's lightweight, it's leakproof. It resists vibration fatigue; shrugs off stresses and strains, jolts and jars. And despite extra strength, ductile Bundyweld bends smoothly, easily, without structural weakening.

Moreover, Bundy's production techniques prove just as amazing as Bundyweld. Bundy engineers turn out exacting bends to specifications, designing new fixtures when necessary. Your fabricated part is inspected stem to stern and shipped ready for production.

Let Bundy® tubing improve your product. For more specific information, ask a Bundyweld distributor listed below or write: ***Bundy Tubing Company, Detroit 14, Michigan.***

THE NEW 27,500-pound Diesel Crawler (above) has just been added to the dependable Allis-Chalmers line. Bundyweld Tubing, double-walled from a single strip, sets performance standards in oil, hydraulic, and (above) fuel lines.

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Bonding metal fuses with basic metal, presto—

Bundyweld . . . double-walled and brazed through 360° all wall contact.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

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1892 **INDUSTRY AND HYATT—PARTNERS IN MECHANICAL PROGRESS** **1951**

Hyatt says "Thank you"

Together we've worked through fifty-eight busy and pleasant years—but the last one, thanks to you, was the greatest in Hyatt's history.

Seems as if all Hyatt users moved ahead with the big production parade in agriculture—textiles—petroleum—highways—automotive—railroads—aviation—steel—material handling and numerous other fields.

The resultant increased orders for Hyatt Roller Bearings, we deeply appreciate. And at the same time we are equally happy over the continued and ever-growing preference for Hyatt precision production and outstanding performance.

In anticipation of your future demands for like workmanship and service, we are constantly providing improvements in our product design, application and manufacturing facilities.

So with our fifty-ninth year ahead, we want all of our old friends, and new, to know Hyatt not for our "age" but for our "experience" as . . . the largest manufacturer of straight cylindrical roller bearings in the world.

HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION
Harrison, N. J., Chicago, Detroit, Pittsburgh, Oakland, Calif.

HYATT ROLLER BEARINGS

SOLID STEEL HEADS, CAPS and MOUNTINGS MACHINED from SOLID BAR STOCK
HARD CHROME PLATED PISTON RODS
DIRT WIPER SEALS
NON-CORROSIVE BRASS BARRELS
Miller

AIR CYLINDERS

SOLID STEEL HEADS, CAPS and MOUNTINGS. Eliminate dangerous, costly breakage under even the severest operating conditions . . . assuring longest possible cylinder life. Standard construction on ALL Miller Cylinders—*both Air and Hydraulic.*

HARD CHROME PLATED PISTON RODS. 90,000 to 110,000 psi yield point heat treated stress relieved steel, accurately ground, polished, then hard chrome plated for extra high resistance to the scratches that commonly cause leakage.

DIRT WIPERS. Wipe piston rods clean on every "in" stroke, protecting piston rods, seals, and bushings from scratch-damage by dirt, scum, abrasive particles. Standard construction on ALL Miller Cylinders — *both Air and Hydraulic.*

NON-CORROSIVE BRASS BARRELS. Eliminate the rust and corrosion caused by moisture always prevalent in plant air lines. Standard construction on all Miller Air Cylinders.

Benefits to You

No Broken Castings
No Scratch-Damage to Piston Rods, Bushings and Seals
NO COSTLY "DOWNTIME"
NO REPAIRS
NO MAINTENANCE
NO POWER WASTAGE

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

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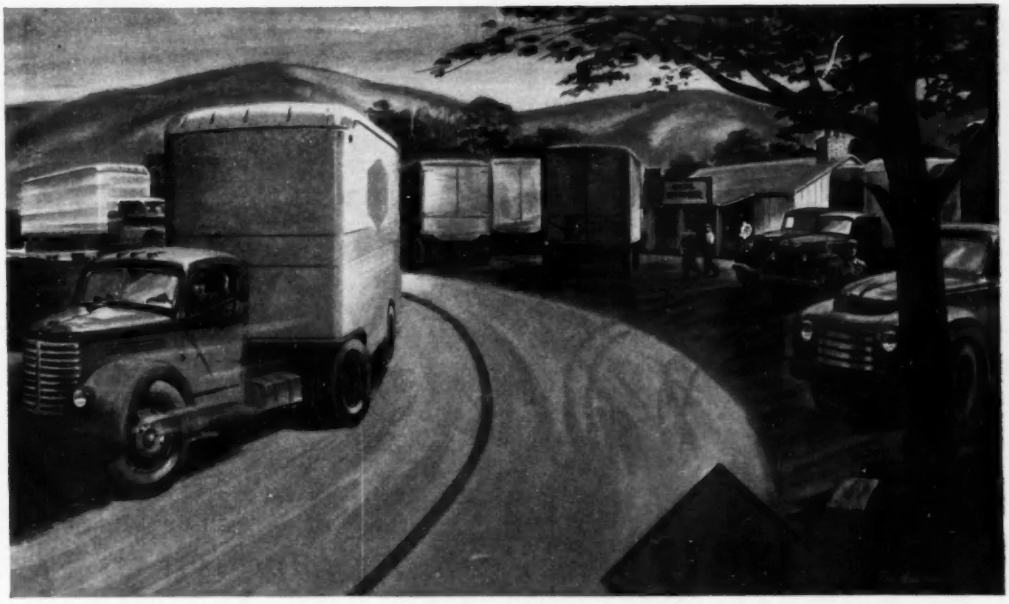
Sales and Service from coast to coast

WHEN THE JOB IS *Tough*



ROSS BRINGS EASE . . . AND ECONOMY

Ross

THIS PICTURE look familiar? Yes, the fellows who drive the big ones like to get together at the "Coffee Stop." Here they talk a lot of shop. Chances are you may overhear them discussing steering.

If you should, listen closely because these boys "know their way around." They expect *ease* of steering, *positive* steering, and that all important *feel* known as *road-sense.*

Ross Cam and Lever gears provide *all* these desirable qualities—hence the *overwhelming* preference for Ross equipped units.

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

WESTERN FELT:

Your Insurance Against Complaints

JUST A FEW USES:

- Retaining lubricants
- Isolating vibration
- Controlling temperature
- Reducing weight
- Excluding dust, grit, etc.
- Cushioning shock
- Filtering liquids
- Grinding and polishing gaskets, grommets, etc.
- Padding, packing, sealing

Felt is not "just felt." There is a vast difference in its manufacture and efficiency. Because Western Felt for over fifty years has not, and will not, depart from its policy of maintaining the highest possible quality in material and manufacture, its products, wherever they may be employed, are your insurance against product complaints due to a Western Felt component part.

Here are just a few of its features that you can always depend on: range from wool softness to rock hardness—never loses shape—does not ravel or fray—resists oil, water, heat, age, resilient, flexible, compressible—may be cut to extremely close tolerances for small parts—unsurpassed in uniformity.

Western Felt engineers with decades of experience in the use of felt stand ready to counsel you.

100F

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Branches in all Principal Cities

Largest Independent Manufacturers and Cutters of wool, hair and jute felts

Every TOOL ENGINEER will want a copy of this NEW BULLETIN!

. . . find out what 5,000 p.s.i.

Hannifin "HY-POWER" Hydraulic Power Units

can do for YOU

HANNIFIN supplies everything you need to make "HY-POWER HYDRAULICS" work efficiently and dependably for you.

HYDRAULIC PRESSURE GENERATORS—The heart of the "Hy-Power" System! Up to 5,000 p.s.i. pressure at your finger-tip under exclusive automatic control. Capable of delivering hundreds of tons of useful force. (Illustrated above).

"HY-POWER" HYDRAULIC CYLINDERS—Built to work at various pressures up to 5,000 p.s.i. Heat treated alloy steel bodies with precision ground bore. Alloy steel rod, case hardened and ground. 9 standard sizes, 2" to 7¼" bore.

COMPLETE MACHINES—"Hy-Power" work units are easy to apply and use in machines of your own design or construction. Hannifin also offers a complete line of standard and specially designed units to meet users particular requirements.

"HY-POWER HYDRAULICS" now makes it practical for tool makers, machine builders, and design engineers to employ hydraulic pressures up to 5,000 p.s.i. under finger tip control to solve innumerable manufacturing problems more efficiently and economically than ever before possible.

"HY-POWER HYDRAULICS" with its fast, automatic operating cycle offers manufacturing plants, large and small alike, almost unbelievable opportunities to reduce unit costs, save time, and improve the quality of work produced on a wide variety of riveting, punching, pressing, shearing, multiple punching, and multiple riveting operations.

For the complete story of "HY-POWER HYDRAULICS", see your local Hannifin representative or send for a copy of new Bulletin No. 150. "HY-POWER HYDRAULICS" is a remarkable engineering development pioneered by Hannifin. *Find out what it can do for YOU!*

ASK FOR NEW BULLETIN No. 150

HANNIFIN CORPORATION

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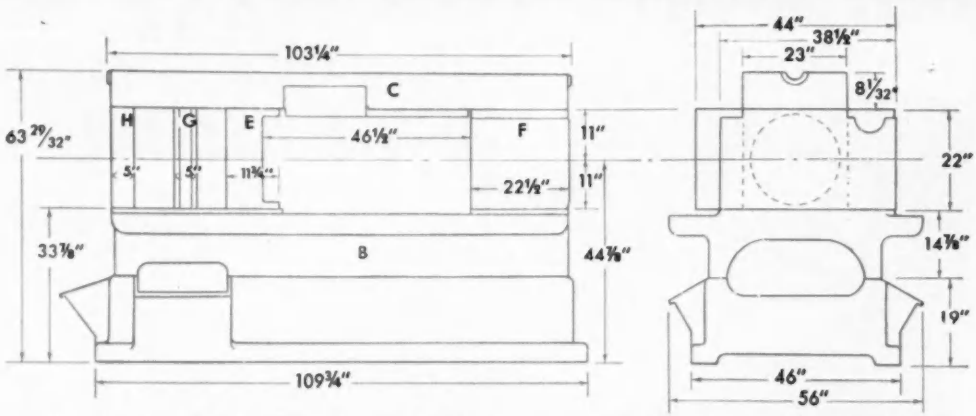
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES



H, G, E — HEADSTOCK SUPPORTS Weight — 1233 lbs. | **B — BASE** Weight — 6655 lbs. | **C — TOP BED** Weight — 1232 lbs. | **F — GEAR BOX** Weight — 841 lbs.

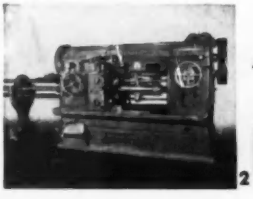
BE VALUE WISE OR OTHERWISE

True of any "means goods," the purchase price of any Multiple Spindle Bar Automatic is only relative. It is "high" or "low" on the basis of the total cost of its total services, compared to other brands. Important items of total cost are those of operation and maintenance.

Machine analysis will invariably disclose the low cost operation and maintenance features that have been "built into" a machine. Such features are built into the CONOMATIC, beginning with its very foundation. The figures above substantiate the claims below.

THE 1½" Six Spindle MACHINE FRAME:

1. **Provides greater capacity for handling work.**
   The Frame provides a LONGER TOOLING AREA, with more positions and accommodations for tooling and attachment applications, with more clearance and conveniences for faster tool setting, than are provided by any other "automatic."
2. **Provides better support to work and tools.**
   The Frame provides better support and alignment to headstock members, tool slides, and other units and mechanisms, with BASE SUPPORT CLOSER TO THE WORK AXIS, with BETTER TOP BED SUPPORT TO SHORTER, "WEAVE PROOF," UPRIGHTS, and, with larger, heavier, and stronger, Top Bed and Base, than are provided by any other "automatic."
3. **Provides greater accessibility for lower cost operation and maintenance.**
   The Frame provides a more orderly arrangement of, and easier access to, all units, mechanisms, parts, and adjustments, than can possibly be provided by any "automatic" that does not have a VISIBLY ACCESSIBLE, NON-INTERFERING CAM SYSTEM.

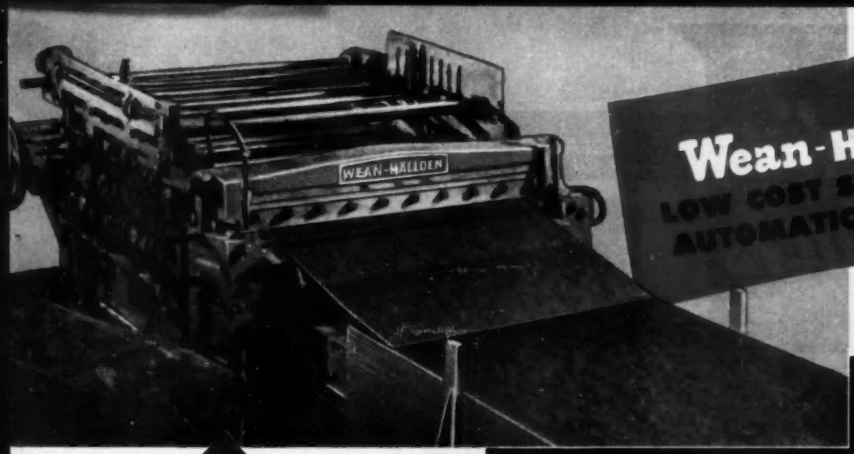


Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

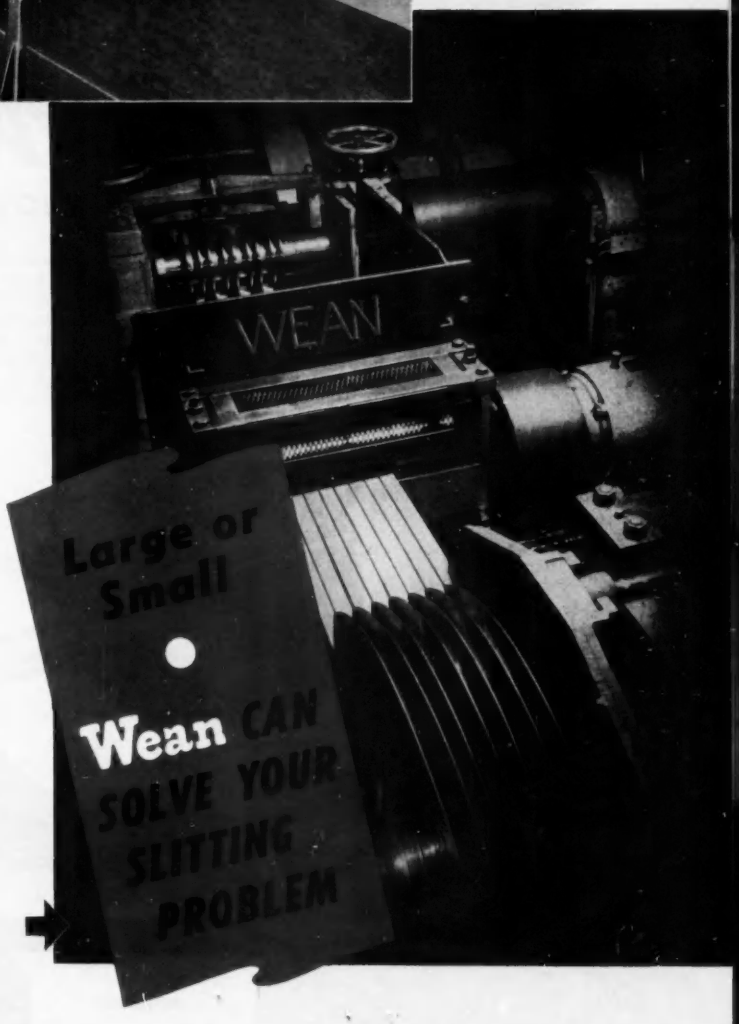


Wean-Hallden

LOW COST SYNCHRONIZED AUTOMATIC SHEAR LINES

THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space*, delivers up to *twice the production.*

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*



If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.

Wean *Equipment Corporation*

CLEVELAND, OHIO

Bendix Products

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

HYDROVAC

THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!

More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one —the Bendix Hydrovac—is preferred above *all* others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further suggests, however, that Hydrovac* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

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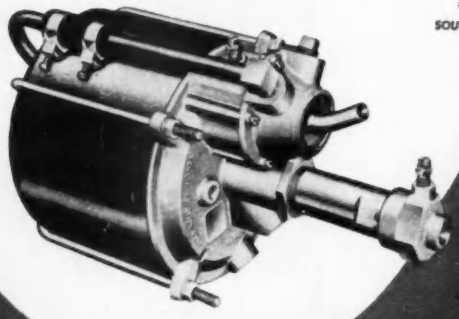

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OF THE BASICS
OF BETTER
MOTOR VEHICLES

AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

★ What's Ahead for the Automobile Industry

There are similarities as well as differences facing the automobile industry now in '51 as compared with a decade ago in the late summer and fall of '41. Highly enlightening statistical information is here presented, pointing the way to the future. Turn to page 32.

★ Jet Fighter Production at GM

General Motors Corp. and Republic Aviation Corp. are negotiating to build F-84 Thunderjet fighters for the Air Force. The Buick-Oldsmobile-Pontiac assembly plant at Kansas City, Kansas, is to be converted from automobile to airplane production. See page 35.

★ Latest Developments in Vehicle Heating

Ideal heating for every type of vehicle is now possible through present engineering knowledge. The cost factor is, however, the limiting factor in such design applications. Here is given a complete analysis of the problems involved. Page 36.

★ Aircraft Industry Must Outdo Itself

The truly stupendous task facing the aircraft industry in the present emergency is brought into sharp focus by author Robert McLarren in this article. Emphasized are various insidious paradoxes affecting air expansion goals. Page 39.

★ Hot Lacquer Spraying

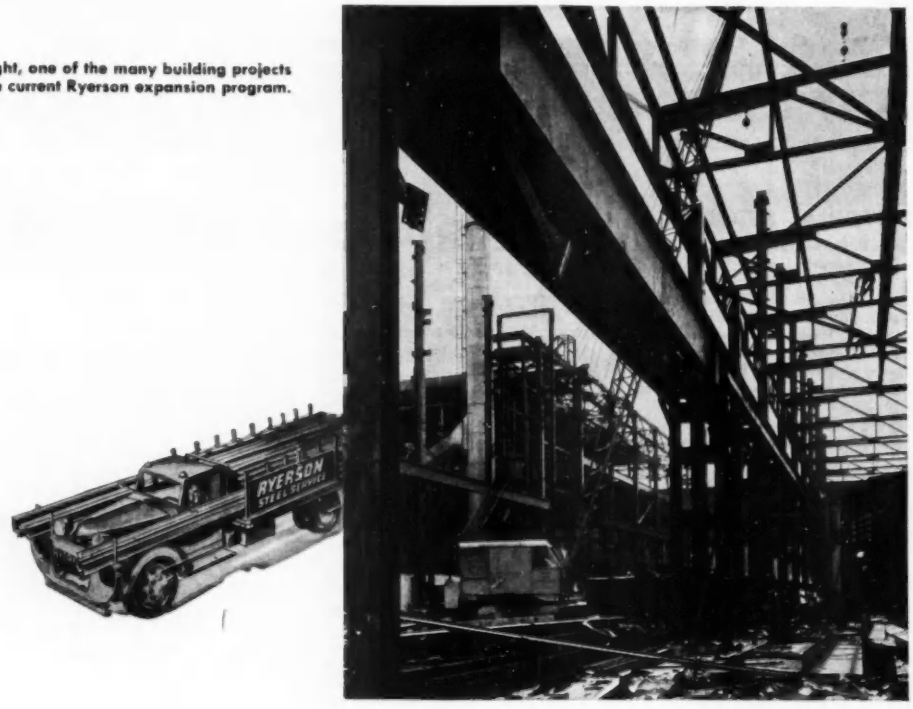
Elimination of a large portion of the waste encountered with the normal method of spraying is the major benefit of the hot spray process. A full report tells how and why hot lacquer applications solve spraying problems. Page 48.

★ 38 New Product Items And Other High Spots, Such As:

Plymouth's '51 styling and mechanical improvements; new Buick bodies; the continued heavy tractor demand expected in '51; how rapid riveting cuts costs in half; how liquid blasting saves die polishing time; machining and hardening in the same setup; and production development of a jettisonable fuel tank.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

At right, one of the many building projects in the current Ryerson expansion program.



Procurement problems today but . . .

We're Building for the Future

Faster and better steel service is in the making at Ryerson. This big new addition to one of the thirteen Ryerson plants is part of an extensive program of expansion and modernization that's under way in Ryerson plants from coast to coast.

As you know, the requirements of national defense, plus peak civilian demand now make it impossible for us to take care of many requirements—much as we would like to. And there's little that we can do to change this situation at the moment.

But we are spending millions of dollars on new plants and equipment in order to be better prepared for the day when we'll again be able to furnish all the steel you need, when you need it. Meanwhile, call us—we'll help you to the limit of our ability.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
REINFORCING—Bars and accessories, spirals, wire mesh
BABBITT—Glyco bearing metal, also Ryertex plastic bearings
MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 104, No. 2 January 15, 1951

Nash Reports Record Output and Profit

The Nash-Kelvinator Corp. broke all records for production, sales, earnings, employment, and payrolls in its fiscal year which ended last Sept. 30. Net earnings totaled more than $30.5 million, or more than $4 million above the previous high year of 1949. Production of 178,827 cars during the fiscal year was 2.7 times above the company's average output in the five prewar years.

Convair-Turboliner Makes First Flight

Powered by two 2750-hp Allison 501 turboprop engines, America's first turboprop transport, the Convair-Turboliner, recently made its initial flight at San Diego, Calif., LaMotte T. Cohu, Consolidated Vultee Aircraft Corp. president and general manager, disclosed in a joint statement with E. B. Newill, GM vice president and general manager of GM's Allison Div.

CAA Issues First Certificate for Roadable Plane

The CAA has issued its first certificate for the production and sale of a roadable plane. Authority has been granted to Robert E. Fulton, Jr., Danbury, Conn. to build and sell a combination automobile and airplane with an air speed of upwards of 100 mph and up to 50 mph on the ground. For ground use the propeller, wings, and tail section are quickly removed.

Dodge Announces 1951 Line

New in Dodge's 1951 line (see cut this page) in the Coronet series is the Sierra having the lines and all-around utility of a station wagon but of all-steel construction. Other Coronet models include: The Diplomat, convertible styled with a steel roof; four-door sedan; club coupe; convertible coupe; and an eight-passenger sedan. The Wayfarer includes: two-door sedan, business coupe, and Sportabout, a low-priced convertible with hand-operated top.

All 1951 Dodge cars have Gyro Fluid Drive as standard equipment. The Gyromatic shift free transmission is expected to be available on all Dodge models except the Wayfarer Sportabout.

From the standpoint of appearance the most noticeable change is found at the front end with the introduction of a new grille, more massive bumpers and bumper guards, and pleasing contouring of front fenders and hood. Vision is improved by narrowing the front body pillars, thus widening the windshield by 2½ in. Rear windows on all models have been widened. On the Wayfarer two-door sedan and business coupe the rear windows have been lowered as well. Interiors have been restyled and feature an instrument panel of modern design with recessed instrument faces and a non-reflecting paint finish and trim.

Among mechanical improvements of interest to owners are: cane-type parking brake lever; more effective use of rubber insulation in body and chassis; improved cooling through adoption of a permanent by-pass and six-blade water pump impeller; use of the narrow wedge-type fan belt; increased generator capacity; and electric windshield wipers on all models.

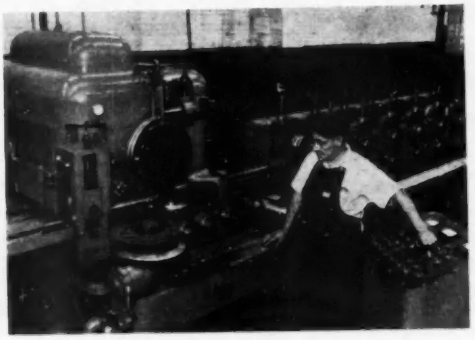
DODGE FOR '51

Dodge cars for 1951 introduce interesting styling changes, and feature improved riding comfort through the adoption of Oriflow shock absorbers (described on page 41 of this issue). The line consists of six body styles in the Coronet series on 123½ in. wheelbase; a Meadowbrook four-door sedan on 123½ in. wheelbase; and three body styles in the Wayfarer series on 115-in. wheelbase.

Eight Million Vehicle Year Reached on Last Day

It was nip and tuck, but the automobile industry finally struggled over the top on the last production day of 1950 to exceed eight million vehicles by a relative handful. Final official figures are not yet available, but it is estimated that production exceeded eight million by some 4000 to 5000 units. Only three passenger car builders failed to exceed their 1949 production. They are Crosley, Packard, and Plymouth. As a whole, the independents retained about the same percentage of the passenger car market this year as they did in 1949, showing a decline of less than one per cent from 14 per cent to 13.02 per cent. Independent truck manufacturers, however, did not fare so well in relation to the Big Three. The independents produced approximately 20 per cent of all truck built in 1950, about 3½ per cent below their 1949 showing and far behind the 30.18 per cent in the record year of 1948. GM came through with a total of 3,818,033 passenger cars and trucks in both U. S. and Canadian plants, consisting of 3,166,254 passenger cars and 651,779 trucks. Chevrolet set two all-time

records for production by a single company last year. In its U. S. plants alone, the division turned out 2,015,150 vehicles and in U. S. and Canadian plants produced 2,017,493 units, the best showing since 1923 when Ford turned out 2,055,906 vehicles for a record that stood until last year. The Ford Motor Co. was in second place with 2,000,492 passenger cars, trucks and tractors. Chrysler turned out an estimated 1,320,000 cars and trucks for a total gain of about 54,000 units over 1949. Passenger cars exceeded the previous year's figure by 78,000, but trucks fell 23,000 short.



LATEST TYPE

In the changeover from conventional shock absorber manufacture to Oriflow, the Chrysler New Castle plant has introduced many new items of production equipment designed to facilitate productivity and quality. Among these is the large steel tube mill shown here. It is an outstanding example of the latest type of tube mill with an automatic resistance welding station which may be seen at the left. Welded tubing is produced at the rate of 50 fpm.

Chrysler Plans to Build New Engine Plant

The Chrysler Corp. is planning to build a new plant at Trenton, Mich. near Detroit for the production of V-8 engines. Although the company refused to comment, Harry R. Matheny, company vice-president, told the Trenton Village Council that Chrysler holds options on a 140-acre site and that the completed project would cost about $20 million. Although the plant is being built primarily for production of the Chrysler V-8 engine, it is also reported that when the plant gets into operation it may be used for military production.

Vehicle Production Off 20% From 1950 Peak

It looks as though the first quarter production will not be affected too drastically by shortages of materials. Several companies have announced curtailed production programs running up to 20 per cent below the very high levels of the third quarter. Both Chrysler and Ford are currently operating at about 20 per cent below September-October schedules and Packard, Studebaker and Nash are about in the same position. GM has been slightly more optimistic and schedules are estimated to be down somewhere from 5 to 10 per cent below the 1950 first quarter. On the other hand, truck schedules are more ambitious and there is a good possibility that as much trucks may be built as in any quarter of 1950.

At the moment, copper appears to be the most serious threat to vehicle production with steel also very critical. Relaxation of the aluminum order to permit manufacturers of functional or moving parts to use in March 75 per cent of the aluminum consumed in the first half of last year instead of only 65 per cent as originally ordered is expected to be of considerable benefit particularly in the matter of pistons. On the other hand, a new order banning use of copper for nonfunctional parts will go into effect in March and probably will affect bright work first. Stainless steel or painted trims can be substituted, however, and that part of the copper order should not have any material effect on the number of vehicles produced. However, the overall curb limiting use of copper to 85 per cent of the base period in January and February and 80 per cent in March creates a critical problem since substitutions are very difficult to make.

1950 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total Vehicles 1950	Total Vehicles 1949
First Quarter	1,312,803	294,137	551	1,637,491	1,379,703
Second Quarter	1,751,399	360,145	1,278	2,112,822	1,820,81
Third Quarter	1,894,676	351,623	1,277	2,247,576	1,864,583
Total—Nine Months	4,958,878	1,005,906	3,106	5,997,889	4,065,098
October	651,169	108,815	553	760,537	573,699
November	504,445	98,538	584	603,567	455,731
Total—Eleven Months	6,144,492	1,213,258	4,243	7,361,993	5,994,528

1950 DOMESTIC TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and Less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-28,000	Over 28,000	Total
First Quarter	126,709	57,323	20,036	39,476	9,080	7,447	5,055	265,126
Second Quarter	158,072	65,209	21,510	48,180	11,572	10,427	7,557	322,527
Third Quarter	157,562	60,296	19,700	44,728	11,303	11,969	7,635	313,193
Total—9 Months	443,343	182,828	61,246	132,384	31,956	29,843	20,247	900,846
October	46,700	24,932	3,020	12,073	2,678	3,751	1,933	97,087
November	40,572	15,669	4,198	10,151	3,743	3,993	2,506	80,832
Total—11 Mos., 1950	529,615	223,429	70,464	154,608	38,376	37,587	24,686	1,078,785
Total—11 Mos., 1949	438,828	245,253	66,457	128,387	25,687	18,187	14,025	936,824

* Automobile Manufacturers Association.

Two Changes in Specs for Indianapolis Race

There are two changes in the specifications for cars entered in the 35th annual 500-mile automobile race at the Indianapolis Motor Speedway on May 30. Two-stroke Diesel engines have been placed on an equal basis with four-stroke Diesel engines and, as a safety precaution, limitations were placed on the overall size of all entries for the first time in Speedway history. The 1951 entries must not exceed 16 ft in length or 6 ft and 3 in. in width.

Chrysler to Build New Tank Plant in Delaware

Robert T. Keller, president of the Chrysler Corp.'s Marine & Industrial Engine Div., has been named general manager (see Men in the News, page 25) of the new Chrysler Delaware tank plant which the company will build at Newark for production of medium

tanks. He was works manager of the Chrysler tank arsenal in Detroit in World War II. Prior to that he had been assistant master mechanic and staff engineer at the arsenal. The new plant will have approximately one million sq ft of floor space with a one-mile test track adjacent to the plant. At volume production it is expected to provide employment for from 3000 to 5000 persons. It will be several months before the plant can be completed and volume production attained.

AMA Names Curtice, Canaday to Board

Harlow H. Curtice, GM executive vice-president, has been elected a director of the Automobile Manufacturers Association to fill the vacancy caused by the retirement of M. E. Coyle, formerly GM executive vice-president. Mr. Curtice was also elected secretary of the Association. In both posts, he fills the unexpired terms of Mr. Coyle. Also elected to the board to fill an existing vacancy was Ward M. Canaday, president of Willys-Overland Motors, Inc.

Air Force Orders Two 50,000-Ton Presses

The U. S. Air Force has announced that it has placed orders for two gigantic hydraulic presses with Loewy Hydropress Co. of New York. The two presses will have a capacity greater than 50,000 tons each and will be the largest in the world, standing six stories high. Plans for the presses came out of research at the Air Force manufacturing methods pilot plant at Adrian, Mich. where several large German presses have been installed. (See page 50, Jan. 1, AUTOMOTIVE INDUSTRIES.)

Car and Truck Registrations Smash All Records

Almost 4½ million more passenger cars and trucks are on the roads this year than last, and since motor vehicle production was resumed at the end of World War II car and truck registrations have increased by 10 million units. Total car and truck registrations as of July 1, 1950, were reported by R. L. Polk & Co., at 43,488,591 units, smashing all previous records. The July 1 figure compares with 39,818,351 passenger cars and trucks registered as of July 1, 1949. The total registration for this year is made up of 35,921,941 passenger cars and 7,566,650 trucks. In addition, there were registered on July 1 approximately 406,000 commercial trailers and 343,000 motorcycles.

Military Announces More Contracts

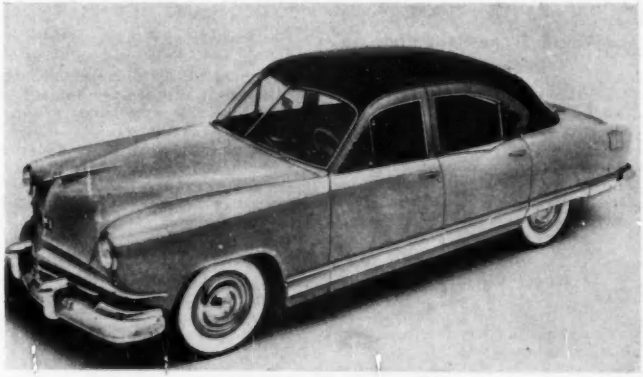
The latest in military orders is a $160 million medium tank order for Chrysler to be built in a new plant to be erected at Newark, Del., a $40 million contract for 35,000 trailers to Fruehauf Trailer Co., and an order for an undisclosed amount of 3½-in. rockets to Oldsmobile. Many more contracts should materialize soon. Among these are an aircraft engine job for Studebaker, a contract to build C-119 Fairchild planes by Kaiser-Frazer, and a gun project for one of the GM divisions.

GM's GMC Truck and Coach Div., has been given a letter contract involving an amount of approximately $100 million, to produce military vehicles for the U. S. Army. An additional contract totaling approximately $57 million has been awarded for one GM Cadillac Motor Car Div. tank building program. A $63 million order for the production of military Jeeps was announced by Willys-Overland Motors, Inc. The Westinghouse Electric Corp. has received an order from the U. S. Air Force for $20 million worth of electrical equipment for a new wind tunnel to test full size jet engines, guided missiles, and wing sections and fuselages of aircraft. Lear, Inc., Grand Rapids, Mich., announced the receipt of additional Air Force contracts in excess of $8 million for Lear F-5 automatic pilots and automatic approach couplers. Link Aviation, Inc., received a $2 million Air Force contract to build trainers simulating the B-47-B stratojet bomber. ACF-Brill Motors Co. has received a notice of Award from the Ordnance Corps, Ordnance Tank-Automotive Center, Detroit, of 602 motor buses for use by military arsenals and depots.

Defense Dept. contracts announced by the Dept. of Commerce included: engines—$5.1 million, Continental Motors Corp., and $3.7 million, Chrysler Corp.; Batteries—$2.5 million, Reading Batteries, Inc.; $1.2 million, Gould National Batteries; $2.1 million, Willard Storage Battery; and $1.2 million, Electric Storage Battery Co.

France's Car Output Hit Record in October

October was a record month for French automobile production, with a total of 36,404 vehicles of all types. This brought the total for the first 10 months of the year to 287,975, compared with 230,957 for the corresponding period of 1949. Passenger cars totaled 147,366, with Renault at the head of the list, followed by Citroen, Peugeot, Simca, and Ford. Exports for the 10 months totaled 94,228, compared with 84,967 one year ago. French colonies and dependencies absorbed 34,972 automobiles, while 59,256 went to foreign countries, with Belgium at the head of the list.



GOLDEN DRAGON

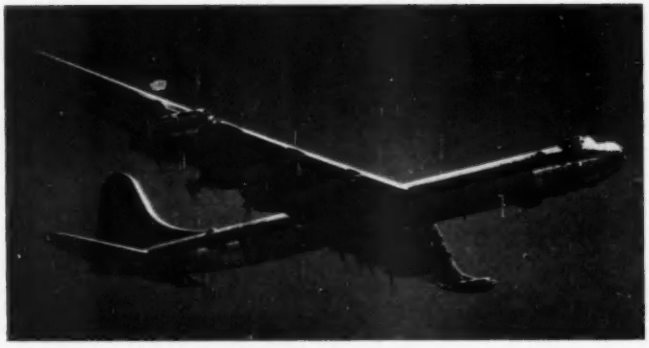
A new line of custom-styled Kaiser models to be known as the Golden Dragon series has been announced by the Kaiser-Frazer Corp. The new series is appearing first in the four-door sedan line, and club coupe and two-door body styles will follow. They are styled in hardtop fashion, and feature new vinyl upholstery in leathery alligator patterns called dragonleather.

Willys Earnings Drop from Previous Year

Willys-Overland Motors, Inc., reports earnings of $1.6 million for the fiscal year ending last Sept. 30, about one-third the profit earned the previous year. Earned surplus and working capital, however, were reported by the company to be at new high levels. The company had on its books last Sept. 30 about $93 million in unfilled government and civilian orders. At latest reports, the figure stood at $173 million.

Repair Parts to Get Material Allotment

There is every assurance that replacement parts will get preferential treatment from the government in order to keep motor vehicle transportation rolling. At a recent meeting in Washington between representatives of NPA and the parts industry advisory committee, the government asked the industry to appoint a seven-man subcommittee to recommend a program for replacement parts production. The committee is charged with determining the amount of steel, copper, and aluminum that will be required for functional parts. Significantly the government is pushing for speed, indicating an early revival of the controlled materials plan that operated during the last war.



FOUR SUPPLEMENT SIX

This is said to be the first high altitude flight view of the Convair B-36D jet-augmented version of the USAF's bomber. Four General Electric J-47 jet engines, mounted in pairs under outer wing edges, supplement six Pratt & Whitney piston engines. The combined total provides over 40,000 hp for takeoff and enables the plane to speed more than 435 mph at altitudes above 45,000 ft.

Lockheed Brake Peacetime Sales Record in 1950

Lockheed Aircraft's sales for 1950 reached approximately $170 million when the corporation's books closed Dec. 31. With the exception of the World War II years, this was the highest sales volume of any year in Lockheed's history. Sales were approximately 44 per cent higher than the 1949 total of $117,667,000.

Name Daisley Head of AAPMA

Robert H. Daisley, vice president of Eaton Manufacturing Co., Cleveland, is the new president of the Automotive & Aviation Parts Manufacturers Association. He succeeds Malcolm Ferguson, president of Bendix Aviation Corp. Other officers include: vice president, W. G. Hancock (president McCord Corp.), and secretary-treasurer, James L. Myers (president Cleveland Graphite Bronze Co.). Newly-elected directors are. A. Neil Gustine (president King-Seeley Corp.); R. C. Ingersoll (president Borg-Warner Corp.); A. J. Mummert (president McQuay-Norris Mfg. Co.); M. F. Peterson (executive vice president Carter Carburetor Corp.); and H. L. Pierson (president Detroit Harvester Co.).

Dearborn Motors Moves into New Building

The Dearborn Motors Corp. has completed and is now occupying a new three-story office building, agricultural research center, and warehouse which serves as national distribution center for Ford tractor parts and accessories. The new building is located in the outskirts of Birmingham, Mich., near Detroit. The facility includes 85,000 sq ft of office space and 165,000 sq ft of floor space in the agricultural research center and warehouse. The research center is equipped to turn out experimental models of new farm implements as well as for testing present equipment as part of the company's research program.

SAE Held Annual Meeting in Detroit

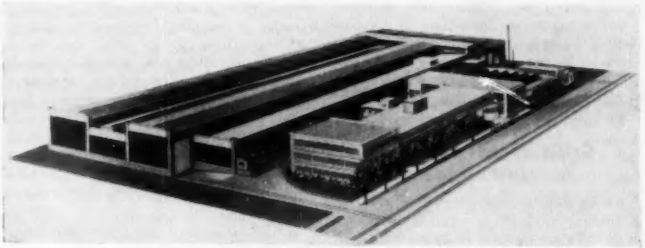
Held from Jan. 8 to 12 in Detroit, the 1951 annual meeting of the Society of Automotive Engineers reviewed engineering progress in various fields of automotive engineering, such as aircraft and aircraft powerplants, Diesel engines, fuels and lubricants, tractors and farm machinery, trucks and buses, passenger cars, transportation and maintenance, vehicle bodies, production, and engineering materials. One session was devoted to the design and manufacture of aluminum bodies for motor vehicles; another to safety in commercial air transportation; and a third to the possibilities of utilizing liquefied petroleum gases as fuel for certain motor vehicles.

The Horning Memorial Medal was presented to D. P. Barnard, of Standard Oil Co. (Indiana), who delivered the Horning Memorial Lecture on "The Role of Fuel in Engine Development." Sidney J. Williams, National Safety Council, delivered the Fourth Beecroft Traffic Safety Engineering Lecture, taking as his subject, "Traffic Safety and the World We Live In."

Ford Sets Up Two New Divisions

The Ford Motor Co. has reorganized its corporate set-up to create two newly-formed groups of manufacturing divisions and has promoted two key executives to the post of vice-president (see Men in the News, page 25). Logan C. Miller, general manager of the Rouge division, has been named vice-president—basic products group, which will include the steel, Dearborn general manufacturing, and manufacturing services divisions. The Rouge division has been discontinued. Ray H. Sullivan, manager of automotive manufacturing operations, has been named vice-president — engine and pressed steel group, which includes the engine and foundry, metal stamping, and parts and equipment manufacturing divisions.

INDUSTRIES



NEARING COMPLETION

The National Automatic Tool Co., Inc., Richmond, Ind., celebrating its 50th anniversary this year will have 254,000 sq ft of floor space in its plant (see above) when new buildings providing for engineering and welding expansion are complete. The buildings are all modern with air-conditioned office and engineering sections.

Rubber Industry Scores All-Time Records in 1950

All-time production and raw materials consumption records in 1950 were set by the rubber manufacturing industry, according to the Rubber Manufacturers Association. Passenger car tire production reached a new peak at 79 million units, as compared with 65 million in 1949 and 78 million in 1947, the previous high. Truck and bus tire production was estimated at 14,150,000 units as compared with 11,230,000 units in 1949 and 17,750,000 units in 1947, the earlier peak. Every branch of the industry reported a higher level of activity as reflected by the increase in rubber consumption to a record of 1,240,000 long tons, up 25 per cent from 1949, and 10 per cent above 1947, the previous peak. The industry consumed 711,000 long tons of natural rubber and 529,000 long tons of synthetic rubber.

John L. Collyer, president of the B. F. Goodrich Company, estimated, after weighing all the factors including the possibility of a major war, that 1951 rubber consumption might range anywhere from 1 million to 1.2 million tons.

Automobile Companies Cancel Price Rises

Ford, GM, Chrysler and Nash have all rescinded higher prices originally posted on 1951 models following the arbitrary price rollback by ESA. Ford refunded the difference between the old and the new price to dealers on all unsold cars in the dealers' stock or in transit. GM went a step further by making rebates to dealers on all cars already sold to customers at the higher prices and requested the dealers to make refunds to the customers. Neither Nash nor Chrysler sold any cars at the new prices. The price order applies only to the manufacture and runs until next March 1.

Douglas Opens Plant in Oklahoma

The Douglas Aircraft Co. will immediately reopen its Tulsa, Okla., plant for the production of Boeing B-47 Stratojet bombers, it was announced by Donald W. Douglas, company president. The production at Tulsa will augment Boeing's curent B-47 program at Wichita, Kans. During World War II, the 4000-ft long plant produced B-24 and A-26 attack bombers.

Goodrich to Build $2.5 Million Plant in Ohio

A $2.5 million plant for the manufacture of industrial rubber products on a 120-acre tract near Marion, O., will be built by the B. F. Goodrich Co. The new plant will have more than 125,000 sq ft of floor space, and work on the buildings will start immediately.

Chicago Dealers Proceed With Plans for Show

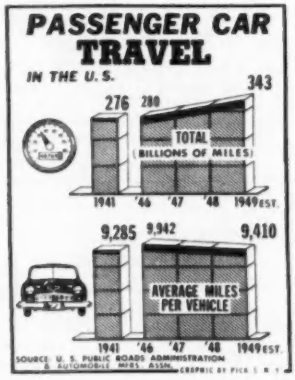
Although automobile dealers in Detroit, Philadelphia, St. Louis, and other places have dropped plans for automobile shows this year, Chicago dealers are proceeding with their plans for what they hope will be the largest automobile show in the history of the industry. It is scheduled for Feb. 17-25 under the auspices of the Chicago Automobile Trade Association. All automobile manufacturers and many truck builders have agreed to cooperate, and exhibit space sold totals more than 150,000 sq ft, a new record.

Canada's Vehicle Registrations Hit New High in 1949

The 1950 issue of "facts and figures of the automobile industry," issued by the Canadian Automobile Chamber of Commerce, includes the following statistics for 1949: The industry employed

WITH TROUBLE-SHOOTER BODIES

The International Harvester Co. has announced the production of two new service-utility trucks specially designed for use in the service and repair field. The trucks feature Aristocrat 'troubleshooter' bodies exclusively designed for L-110, L-120, L-130, or L-150 International chassis, and the bodies are factory-mounted.



more people than in any previous year and paid $76.5 million in salaries and wages. Canadians bought 202,000 cars and trucks and buses at a total retail value of $588 million. A record registration of 2,291,000 vehicles was reached, an average of one motor vehicle for every six persons, or a passenger car for every eight. There are more motor vehicles of every type operating on Canadian highways than ever before.

Voluntary Price Cut Program Fails

Reaction to the government's request to all industry for a rollback of prices to Dec. 1 levels has been anything but hearty. Only a handful of companies have complied with the request. International Harvester Co. has withdrawn increases of about four per cent on farm machinery and industrial power units and of $25 to $100 on trucks. Allis-Chalmers also rolled its farm equipment prices back to Dec. 1 levels eliminating price increases of about eight per cent on tractors. The company says that its rollback will put the company in an impossible position unless its 8000 suppliers also freeze prices. The only rollback in basic materials came from International Nickel Co., Inc., amounting to from ½ cent to five cents per pound on mill products. The revised prices go back to Dec. 13 when the company raised the price of primary nickel by 2½ cents a pound, which still stays in effect.

Thompson Products Starts 30 Per Cent Expansion

Thompson Products, Inc., has started an expansion program which will cost approximately $13 million and provide 30 per cent more facilities to handle defense orders. Employment is expected to increase by 2000 to 3000 next year when a 300,000 sq ft addition is completed.

Crisis Speeds Engine Tooling Program

New engine tooling programs are being rushed by several automobile companies. These include the Ford six and eight, Dodge, De Soto, Buick and Kaiser-Frazer. All of the engines are said to be of the overhead valve type. Apparently the companies want to get set on their 1952 engine designs before war tooling orders interfere with or completely sidetrack the engine programs.

FIGHTS FROST

Frost is being fought in California citrus groves with this Automatic Engine-Driven Wind Tower which is 50 ft high, mounting a 100-hp internal combustion engine driving a 13-ft propeller, moving 320,000 cu ft of air per minute, and slightly inclined to drive the warmer air at this height to the ground level. The supporting platform on top of the tower is geared to revolve one revolution every four minutes, and is controlled by a Synchro-Start control system which automatically starts the engine when the ground temperature reaches 30 F and stops the engine when the temperature is raised to 34 F. The control system is mounted near the ground level in a weather proof cabinet (see cut above) and contains the necessary instruments and signals together with a selector switch providing manual or automatic operation and an "off" position to prevent the tower from functioning. A Mercoid thermostat switch mounted on the outside of the cabinet measures the ground temperature to actuate the controls. In case of an engine failure, an automatically-controlled howler warns the attendant. Otherwise no attention is required except the usual servicing of the engine.

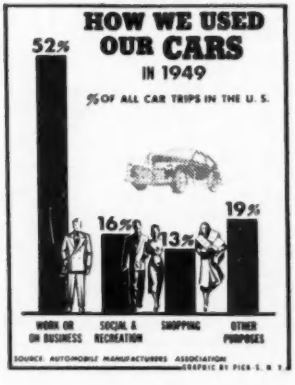
Mr. Riutta and Mr. Al Norris, of Engine Sales & Service, of Los Angeles; Mr. Dyrr, of the Dyrr Machine Co., of Los Angeles; and Mr. Richard T. Puelicher, of Pasadena, who is the western representative of Synchro-Start Products, Inc., of Chicago, developed the tower which was installed on the 20-acre fruit ranch of Mrs. Anna M. Palmberg, at Glenora, Calif.

Tungsten Curtailment Expected For Tools

The cutting tool industry is expecting a curtailment in the use of tungsten in high-speed cutting tools. The NPA has indicated that such a curtailment is coming and has appointed an industry committee to investigate and suggest means of reducing tungsten content and substituting other less critical materials such as molybdenum. During World War II, steel used in cutting tools was permitted a maximum of six per cent tungsten content. Currently the percentage is running about 18 per cent.

Truckers Estimate Needs for Vehicles in 1951

At the request of the defense transport administration the American



Trucking Association has surveyed its members and come up with an estimate of medium and heavy truck requirements for this year. ATA estimates that 1951 requirements will be approximately 418,000 medium trucks and 106,000 heavy units. It also stated that about 96,000 truck-trailers will be required this year. Estimates on the number of light trucks will be turned in later. The government agency will make its own estimates of truck needs for this year and present a claim for necessary materials with NPA.

Stockholders Approve Gemmer-Marles Merger

Stockholders of the Gemmer Manufacturing Co. have approved a merger with Marles Steering Gear Co. of America, Inc., a wholly-owned subsidiary. In addition, the stockholders approved plans for a simplification of Gemmer's capital structure by authorizing capitalization of 750,000 shares of new $5 par common stock to be exchanged for present Class A and Class B shares.

Union Pacific Buys 10 GE Gas Turbine Locomotives

Constituting the nation's first order, 10 gas turbine electric locomotives have been ordered from the General Electric Co. by the Union Pacific Railroad. The locomotives will be similar to a 4500-hp unit which has been undergoing test on regular freight runs of the Union Pacific for the last year and a half. Delivery is expected to begin in the latter part of 1951.

John Bucuss Elected President of Mat'l Handling Institute

John G. Bucuss, general manager, Strapping Div., Acme Steel Co., was elected president of the Materials Handling Institute for 1951 at their annual meeting in New York City. Mr. Bucuss has served successive terms as director, second vice president and first vice president the last three years, and he has been associated with Acme Steel for 32 years.

U. S. Rubber Buys Synthetic Rubber Plant

As a major step in the expansion of its facilities for the manufacture of chemicals, plastics and synthetic rubbers, the United States Rubber Co. has purchased the Buna-N synthetic rubber plant of the Esso Standard Oil Co. in Baton Rouge, La. The plant will be operated by the Naugatuck chemical division of U. S. Rubber which will continue to market Buna-N rubber under the trade name paracril.

The plant now has the capacity to produce approximately 15 million lb of Buna-N synthetic rubber and high styrene latex annually. U. S. Rubber plans to expand production facilities so that the plant will manufacture more than 30 million lb of Buna-N synthetic rubber, high styrene latex and the new rubber-plastic blends annually.

TOWS HALF A MILLION

What is described as the world's mightiest electric-propelled industrial tractor (shown above) was demonstrated by the Automatic Transportation Co., which built it in Chicago. Two Diesel locomotives weighing 500,000 lb were towed by the pilot model which was delivered to the government. The unit has ultimate drawbar pull capacity of 10,000 lb, which enables it to pull as much as 3 million lb on rails. It is 10 ft long and 64 in. wide, and weighs 12,270 lb. Its speed, unloaded, is 21 mph.

Chayne Confirms Critical Nature of Copper Cutback

C. A. Chayne, GM vice president, recently confirmed the impression that although satisfactory alternate materials can be found for certain critical items under restriction, there is no known substitute, from a practical standpoint, for copper. Copper is the number one material in the electrical system and wiring and has no known alternate for the radiator.

Contacts with several major radiator specialists indicates that they have no satisfactory substitute for copper. Experimental work with steel fins during the last war failed to produce satisfactory results owing to difficulties in making good soldered joints. Too, there was a serious corrosion problem. So far as is generally known, in the majority of cases coating materials used to reduce corrosion affect heat transfer properties adversely and have not been effective in covering cut edges.

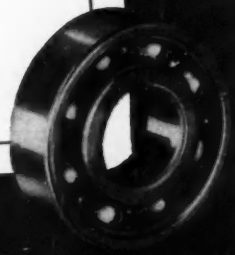
Even if new research were effective in utilizing steel in radiators, the present shortage of steel would prohibit its application. The consensus appears to indicate unavoidably that a reduction in the civilian use of copper will necessitate a corresponding reduction in vehicle output.

Goodyear Unit Puts Synthetic Plant in Production

As a government-owned plant was placed back in production in Akron, O., by a subsidiary of the Goodyear Tire & Rubber Co., the country's synthetic rubber supply will be increased by some 55 million lb in 1951. The government plant will be operated by the Goodyear Synthetic Rubber Corp., under the direction of H. I. Belknap, manager of the parent company's Chemical Div.

You Can't Buy

A BETTER BEARING



The know-how
of bearing making
can't be found
in books.
It's been accumulated
at New Department
for generations
like folk lore.

Nothing Rolls Like a Ball...

NEW DEPARTURE
BALL BEARINGS

NEW DEPARTURE - DIVISION OF GENERAL MOTORS - BRISTOL, CONNECTICUT

122

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Allegheny Ludlum Steel Corp.—**Edward J. Hanley** has been elected president and **Clark W. King** executive vice president. Mr. Hanley, formerly executive vice president, succeeded E. B. Cleborne, who resigned. Mr. King, formerly vice president and treasurer, will retain the position of treasurer. Mr. Cleborne will continue to serve the company as a director and vice president.

Joseph T. Ryerson & Son, Inc. — **Charles L. Hardy** had been elected president, taking the place of **Everett D. Graff** who will become chairman of the executive committee. **Thomas Z. Hayward** was elected vice president in charge of sales. Both Messrs. Hardy and Hayward were elected directors and members of the executive committee.

Fruehauf Trailer Co. — Three new vice presidents have been named: **E. S. Quarngesser**, vice president in charge of the eastern sales division; **W. W. Siegrist**, vice president in charge of the truck body division; and **Harry R. Badger**, vice president in charge of scheduling.

Electric Auto-Lite Co.—**James B. Fenner**, formerly treasurer, was named vice president and comptroller. **Lyman A. Wine**, formerly assistant to the president; **R. M. Lake**, a director of the corporation, and **C. L. Lancaster**, plant manager of the Sharonville, O., plant, have all been named vice presidents.

The Budd Co.—**Ernest R. Schmidt**, has been named vice president in charge of manufacturing, and **Raymond F. Littley** was appointed vice president in charge of sales of all automotive products.

Chrysler Corp.—The appointment of **Clyde C. Williams**, formerly manager of the Marine Engine Div., to general manager of the Marine & Industrial Engine Div. has been announced. **Charles G. Eschenbach** has been appointed assistant director of personnel of the corporation.

The Timken Roller Bearing Co. — **Dwight A. Bessmer**, director of purchases, was named assistant to the president. He was succeeded by **Paul E. Young**.

Commercial Credit Co.—**Edmund L. Grimes**, vice president and controller, was elected executive vice president, and **Thomas A. Duncan**, vice president.

General Electric Co. —Ralph J. Cordiner, formerly executive vice president, was elected president to succeed Charles E. Wilson, who was recently named chairman of the new Defense Mobilization Board.

General Motors Corp., Oldsmobile Div. —Jack F. Wolfram, recently became general manager. Formerly chief engineer of Oldsmobile he succeeds Sherrod E. Skinner, and Harold N. Metsel, Mr. Wolfram's former assistant, becomes Oldsmobile's chief engineer.

Ford Motor Co. — Logan C. Miller has been appointed vice president of the Basic Products Group which includes three divisions: steel, general manufacturing, and the manufacturing services.

Ford Motor Co. — Ray H. Sullivan was recently named vice president of the Engine and Pressed Steel Group.

Chrysler Corp. — Robert T. Keller, president of the Marine and Industrial Engine Div., was recently appointed general manager of the new Chrysler Delaware Tank plant.

E. I. du Pont de Nemours and Co.—Appointment of **Charles B. McCoy**, director of sales of the Explosives Dept., as assistant general manager of the Electrochemicals Dept. was announced. He succeeds **Donald O. Notman** who became general manager of the Electrochemicals Dept. **Malcolm G. Jones** has been named director of sales for the Nylon Div., succeeding **Warren A. Beh**, who has resigned.

General Motors Corp., Pontiac Motor Div.—**E. R. Pettengill** was promoted to administrative assistant to the general manager; **Buel E. Starr** to general manufacturing manager; **A. F. Johnson** to manufacturing manager; **J. P. Charles** to assistant chief engineer; **Charles O. Johnson** to general plant superintendent; and **George Guinn** to axle plant superintendent.

Studebaker Corp.—**Samuel D. Richards**, former special assistant to Paul G. Hoffman in the ECA, has been named assistant treasurer.

Seiberling Rubber Co. — **James Lee Cochrun**, executive vice president, has retired.

American Bosch Corp. — **Foster N. Perry** has been elected executive vice president.

General Electric Co.—**Dr. A. L. Marshall** has been appointed manager, and **Anthony J. Nerad** assistant manager, of the newly-formed Chemistry Divisions of the Research Laboratory. Dr. **Arthur E. Newkirk** has been named assistant to the manager. **Joseph F. Eckel**, manager of the River Works at Lynn, Mass., has been appointed manager of the company's Large Motor and Generator Divisions at Schenectady, N. Y.

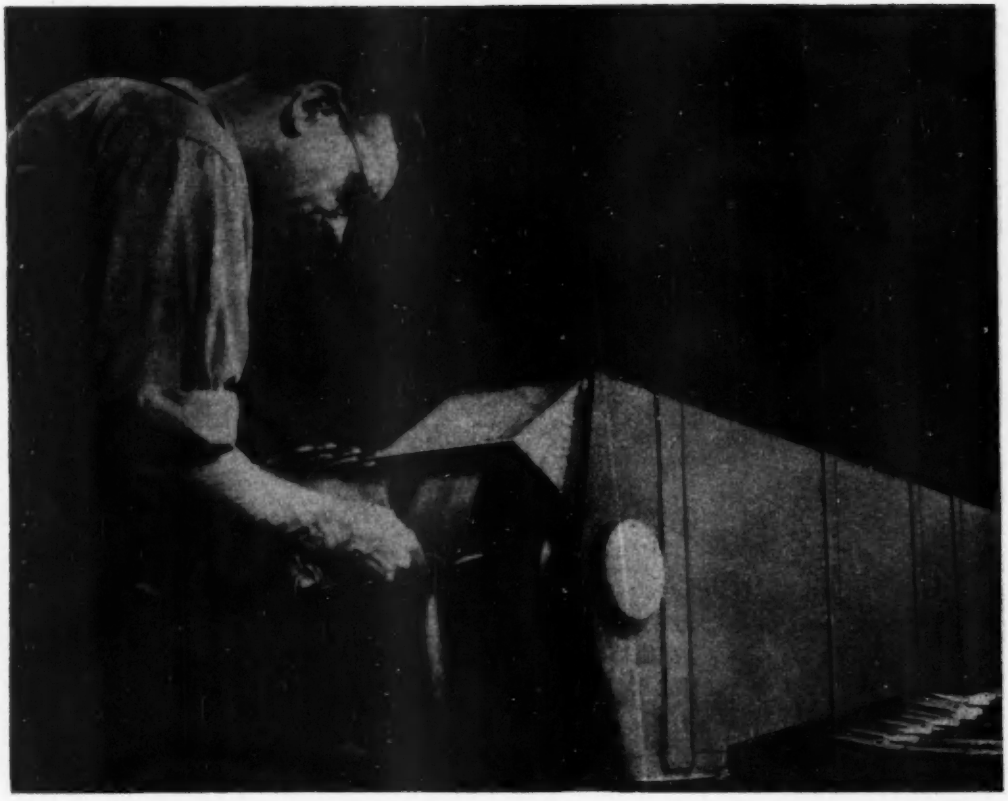
Necrology

John P. Hoelzel, 67, president, Pittsburgh Screw & Bolt Corp., Pittsburgh, died recently.

Newton A. Woodworth, founder and former president of the Ex-Cell-O Corp., and founder of the N. A. Woodworth Co., died on Dec. 27 in Detroit.

Henry E. Bragg, 86, a pioneer in the automotive industries, died Dec. 31 in Parish, N. Y.

Ernest Henry, 62, who was very largely responsible for the design of the 1912-1915 Peugeot racing cars, one of which, driven by Goux, won at Indianapolis in 1913; who designed the straight-eight Ballots which competed at Indianapolis immediately after World War I; and who later represented Bohanlite pistons in France, died Dec. 12 at Paris, France.



Could a wheel do it better?

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Should this ever occur, CARBORUNDUM would undoubtedly be among the first to produce the right wheel. But, *even more important*, we would be fully prepared to explain the pros and cons of both methods. Because only CARBORUNDUM makes a *complete* line of abrasives... we can recommend *impartially* the right abrasive for every application based on our experience with all abrasive products.

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EATON

Zero-Lash

* Registered U. S. Patent Office

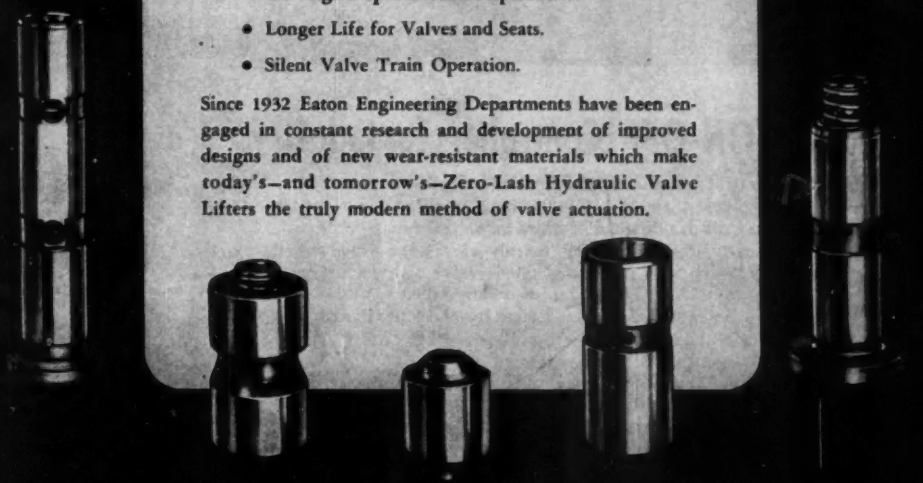
HYDRAULIC VALVE LIFTERS

The Modern Method of Valve Actuation

Millions of Zero-Lash Hydraulic Valve Lifters and Zero-Lash adjusting units—designed and developed exclusively by Eaton Manufacturing Company—have gone into leading automotive, aircraft, tractor, marine and industrial engines in the last 17 years. They have contributed:

- **Freedom from Tappet Adjustments for the Life of the Engine.**
- **Accurate Valve Timing and Perfect Seating at All Engine Speeds and Temperatures.**
- **Longer Life for Valves and Seats.**
- **Silent Valve Train Operation.**

Since 1932 Eaton Engineering Departments have been engaged in constant research and development of improved designs and of new wear-resistant materials which make today's—and tomorrow's—Zero-Lash Hydraulic Valve Lifters the truly modern method of valve actuation.



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CLEVELAND, OHIO

Saginaw Division

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PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

SPEEDOMAX (OR MICROMAX) STRIP-CHART ON-OFF CONTROLLER

SPEEDOMAX ROUND-CHART ON-OFF CONTROLLER

MICROMAX MODEL C ON-OFF CONTROLLER

ELECTROMAX ON-OFF CONTROLLER

Dependable "ON-OFF" Controllers for Industry

THE kind of control instrument which industry calls on-off or 2-position is not only the oldest form of automatic regulator, but is one which many manufacturers still use, instead of more advanced types, for simple requirements. Usually, the instrument merely closes the valve when temperature reaches the control point, and opens valve again when temperature falls below point. The question of whether such on-off action is best for the given case can of course be settled by using the instrument with the best, most useful features. Here are some which L&N On-Off Controllers offer:

1. Instruments may be Recording Controllers with either strip-chart or round-chart, or Controllers with no charts at all.
2. Instruments can operate at high or moderate speed; can be located regardless of machine vibration, building tremors or distance from process.
3. Controls are outstandingly dependable because they "balance" temperature against a standard. Intermediate bearings and springs cannot increase, decrease or otherwise influence accuracy or sensitivity.
4. Low maintenance assured by machine-like design and construction.
5. More than 1000 standard ranges. Specials are available, but seldom needed.

Tell us your problem and we will send further information. Write either to our nearest office or to 4966 Stenton Avenue, Philadelphia 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

THESE instruments are fully automatic; need no standardizing; are ideal even for hard-to-get-at or difficult locations.

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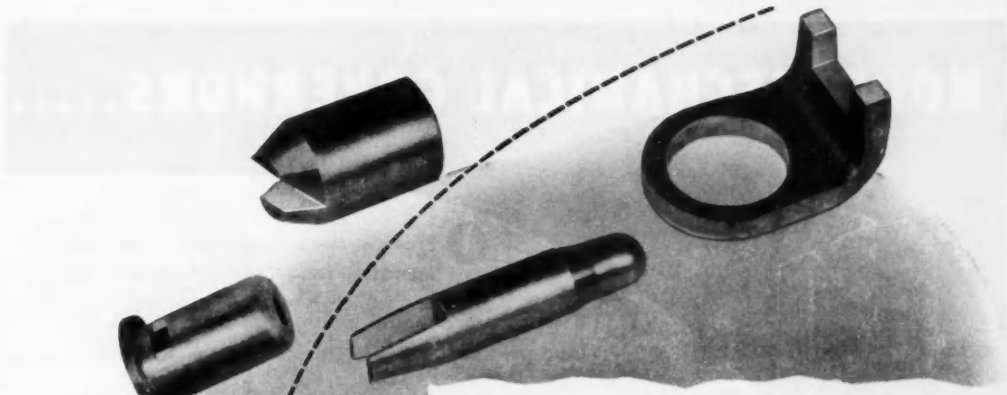
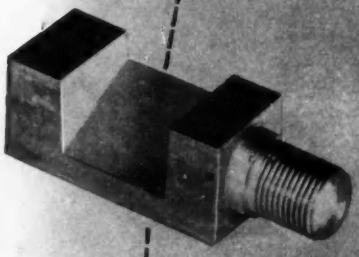


high production through Surface Broaching



Continuous Broaching Machine. Made in 4 Sizes.

● Cost per piece is of primary importance in the machining of all metal parts. Surface broaching is being used in many plants to produce work similar to these illustrations, with higher production per machine and lower tool maintenance cost than was possible with former machining methods. We will be glad to work with you on the possibility of applying surface broaching to your work. Send blueprints of your parts and production requirements.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

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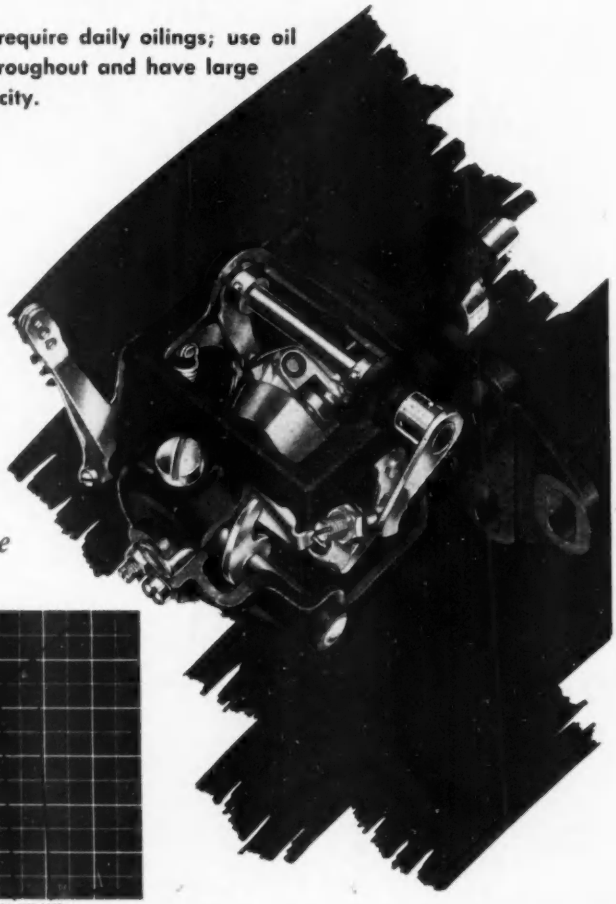
Surface Broaching
FOR DIFFICULT MACHINING WORK

FOOTBURT SURFACE BROACHING

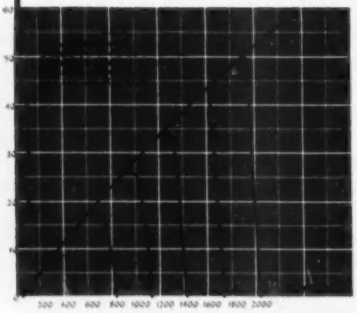
ENGINEERED FOR PRODUCTION

HOOF MECHANICAL GOVERNORS.....

1. Provide close regulation over wide operating range, *without spring change.*
2. Employ ball or roller bearings at all load points.
3. Do not require daily oilings; use oil seals throughout and have large oil capacity.



This is the Performance Graph



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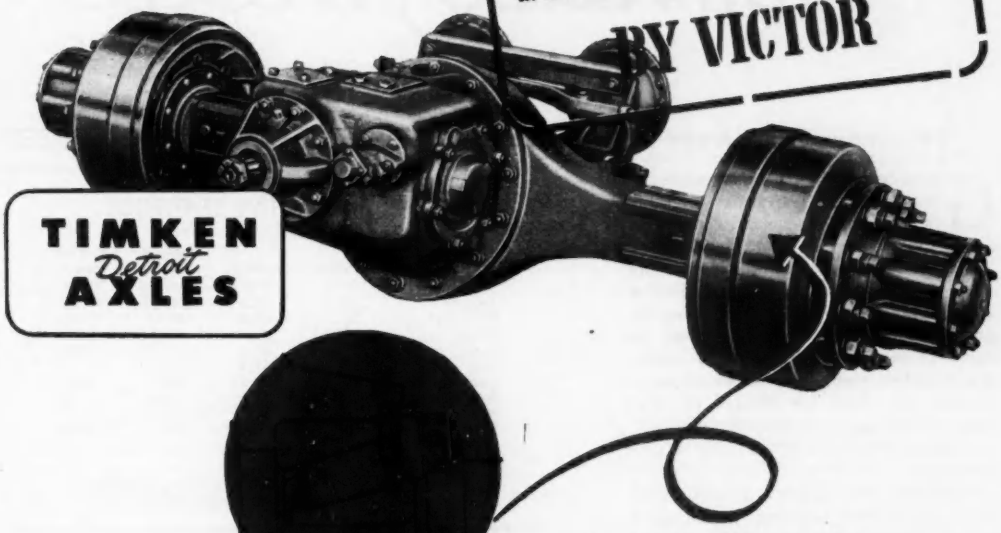
SEALED TO ORDER BY VICTOR



AXLE SEALING AT ITS BEST —WITH VICTOPRENE

Patented by Timken-Detroit, and made only by Victor, this inner axle seal fulfills every intent of its designer and user. Installed as a 2-piece assembly, the unit permits renewal of wearing parts and protects the seal from damage when servicing axle. Victoprene sealing element gives maximum efficiency to the flex joint.

OIL SEALS PRECISELY MADE TO YOUR SPECIFICATIONS!

Not many bearing seal specifications are more exacting than those for heavy duty truck axles. Yet, manufacturing to such specifications —as we're doing for The Timken-Detroit Axle Company—is the class of work we like best. It falls right in with the year-in, year-out tempo in Victor plants—close tolerance manufacturing to the highest quality standards. It's the backbone of Victor's leadership in automotive sealing products.

A COMPLETE SERVICE TO AUTOMOTIVE INDUSTRIES

Whether you write the specifications or invite us to work them out with you, Victor places unmatched sealing experience at your disposal. 55 basic patents testify to Victor's grounding in modern oil seal design, including development of Victoprene—the now universally used Victor sealing element. Victor engineering service includes all laboratory facilities, also dynamometer testing.

Where can we help you to better sealing?

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VICTOR

"ORIGINAL EQUIPMENT"

Gaskets and Oil Seals

SEALING PRODUCTS ***EXCLUSIVELY***

What's Ahead

By Leonard Westrate

GOING into 1951, the automobile industry faces a situation quite similar to that which existed during the late summer and fall in 1941. Then, as now, confusion and uncertainty were everywhere and curtailed production and shortages of materials were everyday problems. Vehicle output had been reduced successively by government order, which differs from the current situation in that reductions are effected by arbitrary restrictions on materials, thus limiting the number of units that can be produced.

Then, too, the industry was winding up a boom production year and was not again to reach those levels until 1947. In one respect the situation today is different from what it was at the outset of 1942 when the nation was already at war. For the present at least, the plan is to maintain a "guns and butter" economy embracing a sizable military preparedness program together with continued civilian production of cars and trucks within the limits of materials available. Just how much vehicle production will be cut back this year is impossible to determine now, but it is certain that it will be considerably less, with most estimates ranging from 25 to 50 per cent. More extreme predictions put the cutback at an even higher percentage and there are some who believe that production of passenger cars at least may be stopped entirely before the year is out. However, the real key to the whole situation is what happens on the military front, that is, whether there is an allout war or whether the present military operation in Korea will be contained and the defense program carried along on the current basis. Even so it is evident that first quarter production is to be reduced substantially from the levels prevailing late in 1950. Packard and Studebaker have announced reductions of 20 per cent in output, Nash has cut back 15 to 20 per cent, and Ford reduced production 160 cars a day at its Lincoln-Mercury as-

1950 AUTOMOTIVE STATISTICS

Bureau of Labor

Month	Employment	Average Hours	Average Weekly Earnings	Average Hourly Rates
January	675.4	40.9	$70.14	$1.715
February*	567.1	39.6	67.64	1.708
March*	575.6	40.4	69.08	1.710
April*	595.3	42.2	73.77	1.748
May	736.3	41.4	71.66	1.731
June	763.2	42.9	75.72	1.765
July	753.7	42.6	75.06	1.762
August	774.1	42.3	75.12	1.776
September	790.9	40.8	74.01	1.814

* Chrysler Strike.

Source: Monthly Labor Review & Employment, Payroll & Man Hours Report—BLS

LAST 10 YEARS PRODUCTION BELOW THE '20s AND '30s

Factory Sales of Passenger Cars From U. S. Plants

Year	Number	Year	Number	Year	Number
1921	1,468,067	1931	1,973,090	1941	3,779,682
1922	2,274,185	1932	1,135,491	1942	222,862
1923	3,624,717	1933	1,573,512	1943	139
1924	3,185,881	1934	2,177,919	1944	610
1925	3,735,171	1935	3,252,244	1945	69,532
1926	3,783,987	1936	3,669,526	1946	2,148,699
1927	2,936,533	1937	3,915,889	1947	3,558,178
1928	3,815,417	1938	2,000,985	1948	3,909,270
1929	4,587,400	1939	2,866,796	1949	5,119,466
1930	2,784,745	1940	3,717,385	1950	6,672,700 (est.)
Total	32,196,103	Total	26,282,839	Total	25,481,138

for the Automobile Industry

sembly plant at Metuchen, N. J., at the outset of 1951 and undoubtedly will curtail production in other plants also. General Motors and Chrysler have not been specific in the percentages of cutbacks contemplated for the first quarter, but they probably will run 15 to 20 per cent at least. It appears that materials are getting tighter faster than had been expected. General Motors was forced to close its five B-O-P assembly plants the first week of this year because of a sudden acute shortage of materials. It is expected that the industry will be constantly harassed by spot shortages which will result in marked overall reduction in vehicle production throughout the year.

The phenomenal performance of the automotive industries in 1950 set records that certainly will not be matched this year and possibly not for many years to come. The more than eight million vehicles built was 28 per cent above 1949, with passenger cars totaling 6.67 million, up 30 per cent over the year before. Trucks and buses totaled 1.3 million, 18 per cent above 1949 but 2½ per cent below the previous record year of 1948. Replacement parts sales totaled $2 billion, six per cent above the previous year, but 27 per cent behind the alltime record of $2.55 billion in 1948. However, new records were set in several other phases of the industry, the increases over 1949 being as follows: Wholesale value of passenger cars, 30 per cent; trucks and buses, 18 per cent; passenger cars, trucks and buses combined, 28 per cent; motor vehicle registrations, nine per cent for passenger cars and seven per cent for trucks and buses; employment, nine per cent; annual payroll, 22 per cent; special vehicle taxes, 11 per cent, and vehicle miles traveled, seven per cent. Exports continued to show a decline throughout the year for passenger cars with a seven per cent reduction. However, truck and bus exports were three per cent greater than in 1949.

In the closing days of 1950, military contracts were starting to pour into the automotive industries at an accelerating rate. It is estimated that by year-end,

MAJOR MILITARY CONTRACTS

In the Automotive Industries up to January 1

Company		Amount
Cadillac Division General Motors Corp.	Light tanks	$167 million
GMC Truck & Coach Div. General Motors Corp.	2½-ton trucks	$100 million
Willys-Overland Motors	Jeeps, engines, replacement parts	$132 million
Chrysler Corporation	Medium tanks	$160 million
International Harvester Company	Carriers, trucks, engine parts and other items	$200 million
Fruehauf Trailer Co.	Cargo trailers	$ 40 million
Reo Motors, Inc.	Military trucks	$ 55 million
Studebaker Corporation	Military trucks (4000)	.....
AC Spark Plug Div. General Motors Corp.	Jet fighter plane gun sights	$ 20 million
Continental Motors Corp.	Engines for tanks and other combat vehicles	$ 50 million
Ternstedt Division General Motors Corp.	Range finders	$ 8 million
Packard Motor Car Co.	Development and product contract for Diesel engines for the Navy	$ 4 million
Oldsmobile Div. General Motors Corp.	3.5 in. shells	.....
Buick Motor Div. General Motors Corp.	Cross drive transmissions for tanks	.....
Ford Motor Co.	Aircraft engines	$ 35 million

This does not represent all the contracts in the industry, but only the major ones which have already been announced.

What's Ahead

for the Automobile Industry

such contracts in the industry totaled approximately $3 billion. That is only a start, however, and in the months ahead more and larger major contracts under negotiation will be let. These are bound to take materials, manpower, and facilities away from vehicle production.

Largest military contracts so far in the automotive industries are shown in one of the accompanying tables. Kaiser-Frazer is expected to get a large order for C-119 cargo aircraft, and a guided missile project is said to be under discussion for Ford. Studebaker is reported to be under consideration for an aircraft engine contract, in addition to its present order for military trucks. Undoubtedly there are many more contracts being negotiated for production of guns, jet engines, tanks and other items in the industry's plants.

Many of the truck companies also have orders for defense items. Federal Motor Truck Co. has orders for more than $3 million worth of replacement items and Diamond T orders total more than $6 million. Other truck companies with defense work are Mack, FWD, Biederman, and Autocar. A. C. F. Brill orders

(*Turn to page* 142, *please*)

PRELIMINARY "FACTS AND FIGURES" FOR 1950

	1929	1941	1948	1948	1950	Percent Increase 1950 Over 1949
Factory Sales—Number						
Passenger Cars	4,587,400	3,779,682	3,909,270	5,119,466	6,672,700	30%
Trucks and Buses	771,020	1,060,820	1,376,155	1,134,136	1,343,050	18%
Total	5,358,420	4,840,502	5,285,425	6,253,602	8,015,750	28%
Factory Sales Wholesale Value						
Passenger Cars	$2,847,118,562	$2,567,205,996	$4,853,402,000	$6,768,418,000	$8,825,000,000	30%
Trucks and Buses	566,029,644	1,069,799,855	1,858,210,000	1,407,435,000	1,670,000,000	18%
Total	3,413,148,206	3,637,005,851	6,711,612,000	8,185,853,000	10,495,000,000	28%
Vehicles Exported—Number						
Passenger Cars	451,095	98,124	233,177	156,141	145,000	−7%
Trucks and Buses	282,667	110,787*	203,040	131,634	135,000	+3%
Total	733,762	208,911*	436,217	287,775	280,000	−3%
Replacement Parts and Accessories, Domestic Market, Wholesale Value	N. A.	$718,212,295	$2,553,000,000	$1,895,000,000	$2,000,000,000	6%
Motor Vehicle Registrations, December 31						
Passenger Cars	23,060,421	29,614,356	33,385,867	36,433,674	39,710,000	9%
Trucks and Buses	3,442,087	5,239,618	7,751,151	8,236,914	8,774,000	7%
Total	26,502,508	34,853,974	41,137,018	44,670,588	48,484,000	9%
Employment						
Production Workers	471,000	570,000	657,600	643,500	715,000	11%
All Employes, Inc. Salaried	518,000	654,000	792,800	769,000	840,000	9%
Annual Payroll						
Production Workers	$788,892,000	$1,173,557,000	$2,115,215,000	$2,204,811,000	$2,700,000,000	22%
Special Taxes on Motor Vehicles						
State Registration Fees	$347,697,000	$511,242,000	$755,183,000	$833,639,000	$905,000,000	9%
State Gasoline Tax	431,636,000	957,312,000	1,350,028,000	1,474,508,000	1,725,000,000	17%
Federal Excise Tax		572,759,000	1,154,370,000	1,304,500,000	1,440,000,000	10%
Other	70,451,000	144,360,000	213,597,000	232,000,000	250,000,000	8%
Total	849,784,000	2,185,673,000	3,473,178,000	3,884,647,000	4,320,000,000	11%
Age of Passenger Cars in Use	N. A.	5.5 years	8.8 years	8.5 years	8.0 years	
Vehicle Miles Traveled						
Rural	N. A.	169,803,000,000	198,507,000,000	215,000,000,000	N. A.	N. A.
Urban	N. A.	163,591,000,000	199,082,000,000	210,000,000,000	N. A.	N. A.
Total	200,000,000,000	333,396,000,000	397,589,000,000	425,000,000,000	456,000,000,000	7%

N. A.—Not Available. *—Civilian Vehicles Only.

GM to Convert Kansas City Plant to

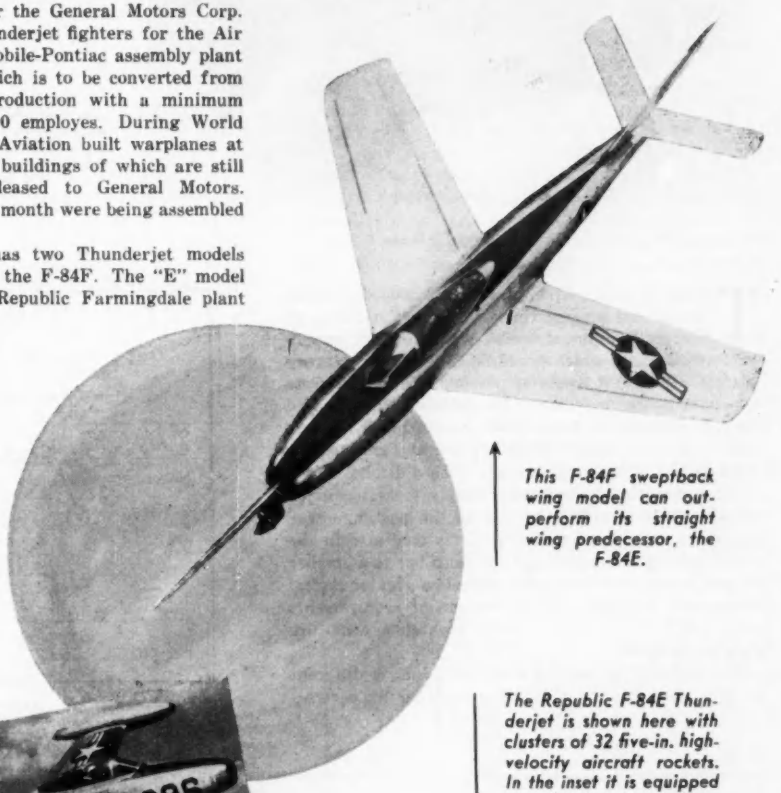
Jet Fighter Production

NEGOTIATIONS are underway with the Republic Aviation Corp. for the General Motors Corp. to build F-84 Thunderjet fighters for the Air Force at the Buick-Oldsmobile-Pontiac assembly plant at Kansas City, Kan., which is to be converted from automobile to airplane production with a minimum layoff of the present 5000 employes. During World War II North American Aviation built warplanes at that plant, the lands and buildings of which are still Government-owned and leased to General Motors. Lately about 20,000 cars a month were being assembled there.

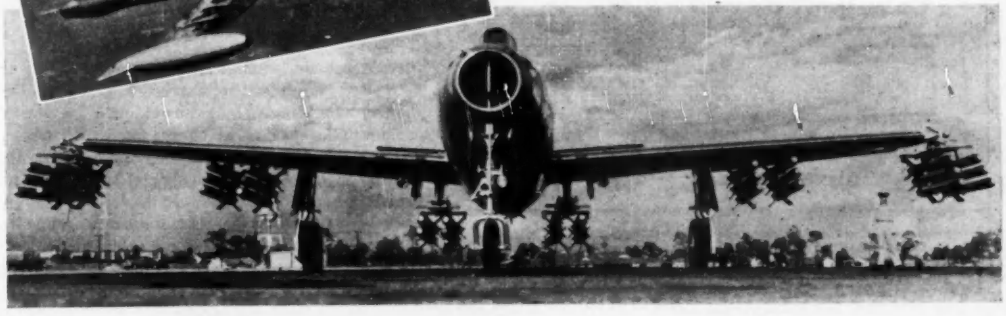
At present Republic has two Thunderjet models available—the F-84E and the F-84F. The "E" model is in production at the Republic Farmingdale plant and squadrons of them are in operation in the current war in Korea. The "F" model is still in the experimental stage, but it is understood that GM will begin producing it just as soon as the Kansas City plant can be tooled up.

The F-84E Thunderjet is powered by an Allison J-35-A-17

(*Turn to page* 104)



This F-84F sweptback wing model can outperform its straight wing predecessor, the F-84E.



The Republic F-84E Thunderjet is shown here with clusters of 32 five-in. high-velocity aircraft rockets. In the inset it is equipped with wing tip tanks.

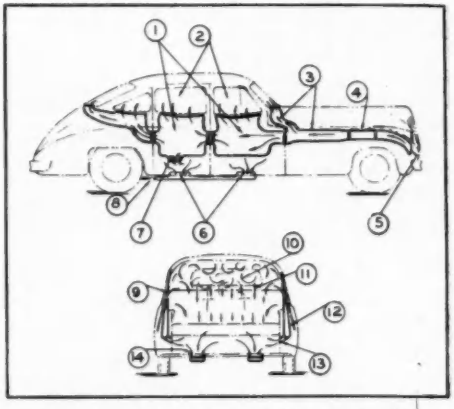
Latest

By F. A. Ryder
Chief Engineer, Southwind Div.
Stewart-Warner Corp.

This phantom view of the familiar Army jeep reveals an installation of the Stewart-Warner Model 978 military heater. The heater, mounted in a box at the right rear corner of the personnel compartment, draws 100 per cent fresh air.

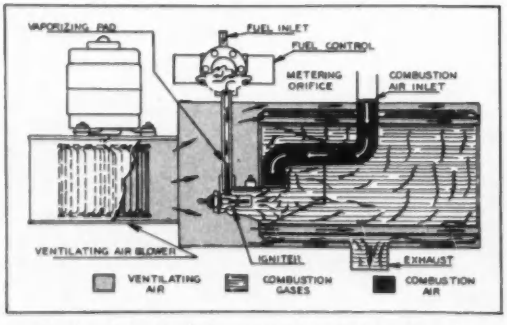
THERE is sufficient engineering knowledge available at the present time to permit the design of heating equipment which would exhibit superb performance and which would be satisfactory in every respect. Indeed, it would be possible to build complete air-conditioning equipment for vehicles which would provide heating, cooling, filtering, and humidity control. One then quite naturally asks why such equipment is not available generally. The difficulty is one of economics; such equipment simply costs too much money. This is definitely true in the passenger car and truck cabin heating fields. It is true also in the cargo heating and passenger bus fields but to a smaller degree, because in these fields there is a greater capital investment involved and the equipment requirements are more critical; therefore, a greater expenditure may be justified.

The problem of heating a vehicle is much different from that of heating a building or other fixed structure. A vehicle is small and the volume of air to be heated per person is, therefore, much smaller than in a building. Since the vehicle is moving at considerable velocity at times, there will be air leaks which will affect heat loss calculations; net results, however, may be beneficial because of the ventilation thus provided. In a vehicle the air must be delivered at points close to the occupants and, therefore, it is difficult to achieve adequate mixing, satisfactory air temperature, low noise level, low temperature gradients, etc.



Representing one concept of the ideal in automobile heating and ventilating, this system employs a heater under the hood, side panel radiant heating, up-draft ventilation across all windows, and down-draft exhaust.

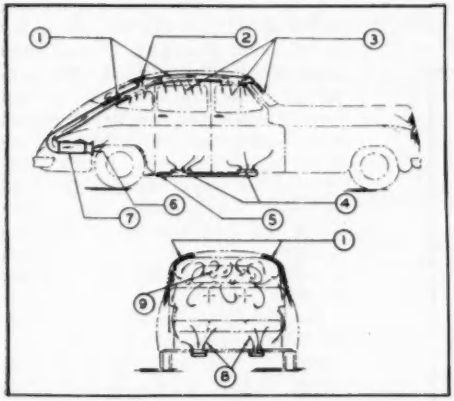
1—radiation heating from side panels; 2—convective heating from internal circulation; 3—ducts; 4—heater; 5—inlet; 6—outlet grills; 7—louvres; 8—outlet; 9—precipitation on glass prevented by jet of heated air; 10—convection turbulence; 11—low downward velocity; 12—side panel duct and heating arrangement; 13—louvres for discharge at ankle level; 14—odors and discharged air out bottom.



Besides showing the various component parts that make up the heater, this sketch illustrates the method of operation. Fuel is metered by a fuel governor and valve and a glow plug is used as an igniter. Combustion gases pass through the heat exchanger twice before being exhausted.

Developments in

Vehicle Heating



For this proposed heating and ventilating system, air is taken in through a duct in back of the rear wheel. It provides for down-draft ventilation over all windows and down-draft exhaust.

1—ducts; 2—cross-over duct; 3—downward flow over all windows; 4—outlet grills; 5—outlet; 6—inlet; 7—heater; 8—discharged air to outlet; 9—internal convective turbulence.

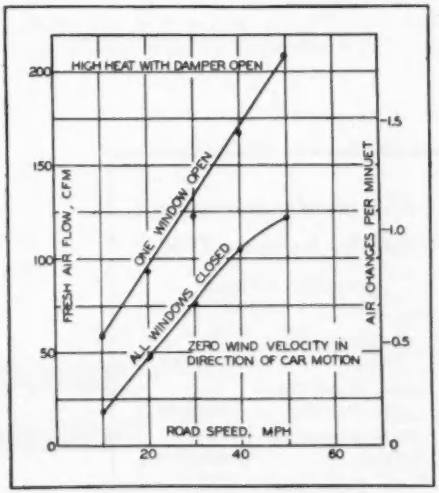
Control

One trend in vehicle heating is toward completely automatic heat control. In the case of hot water type heaters, this is accomplished by a thermostat which actuates a throttling valve in the coolant line to the heater. In the case of combustion type heaters, the thermostat controls the flow of fuel to the burner by means of an electrically operated valve. This may be accomplished in several distinct stages or it may be a simple on-off arrangement. Either system can be made to operate satisfactorily if it is carefully designed.

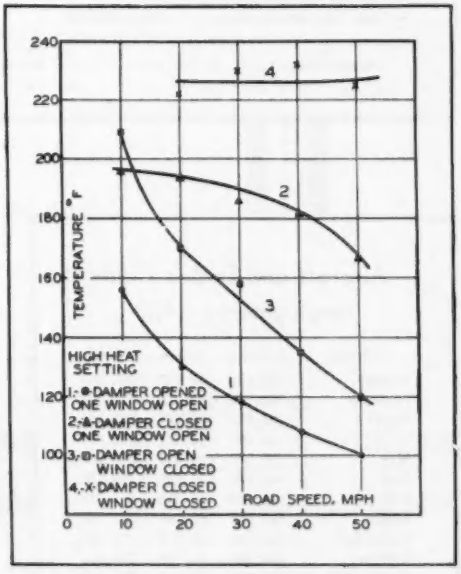
Ventilation

Almost all modern heater designs provide for the forced induction of fresh air into the vehicle where it is then passed through a heat exchanger and discharged into the passenger space. Some method is usually provided for modulating the amount of fresh air and in some cases a split system is used wherein

(*Turn to page* 134, *please*)



Fresh air intake rate is plotted against road speed for the Stewart-Warner Model 909 combustion heater when mounted in a 1949 Chevrolet. As shown, there is an extremely wide variation in air induction because of variable road speeds.



The use of fresh air in a heating system improves temperature distribution and permits wide modulation of the heat output as illustrated by this chart of heater outlet temperature versus road speed.

Aircraft

By Robert McLarren

THE aircraft manufacturing industry is squarely facing the task of doubling its fabulous achievement of World War II—and the end is far from sight. President Truman has asked the industry for a five-fold production increase in one year, whereas the Herculean expansions of World War II permitted only a three-fold increase in a single year, graphic indication of the size of the industry's current task. Compounding the problem is the fact that today's electronically-controlled high-performance combat aircraft are enormously more complex and time-taking to build.

The industry's leaders are understandably reticent when asked the blunt question: "Can you do it?" No one knows, for sure; all are willing to try. But the historic cards are stacked full against such an accomplishment by the existing industry and something of the pattern of the Government's solution to the problem is becoming clear: enlistment of the automobile industry on a large scale.

Initial committments in this direction include:

General Motors Corp. will build the swept-wing Republic F-84F Thunderjet

Military Aircraft Procurement Fiscal Year—1951

U. S. Air Force		
Fiscal 1951 Appropriation	$1,565,106,708	
1950 Defense Production Act	2,936,119,764	
Second Supplemental	2,114,700,000	
		$6,615,926,472
Naval Aviation		
Fiscal 1951 Appropriation	$733,627,855	
1950 Defense Production Act	646,269,344	
Second Supplemental	1,162,989,028	
		2,542,886,227
U. S. Army		
Fiscal 1951 Appropriation	$52,920,332	
		52,920,332
Mutual Defense Assistance Program		
Fiscal 1951 Appropriation	$1,148,450,100	
		1,148,450,100
Grand Total		$10,360,183,131

Aircraft and Engine Plant Employment—1950

Month	Airframe	Engine	Total
January	163,531	39,837	203,368
February	162,741	40,035	202,776
March	162,846	40,272	203,118
April	164,998	40,472	205,470
May	165,273	40,687	205,960
June	166,773	41,425	208,198
July	169,230	41,886	211,116
August	180,186	42,169	222,355
September	191,649	39,410	231,059
October	200,585	40,088	240,673
Jan. 1, 1951 (estimated)	225,000	45,000	270,000

Aircraft Manufacturing Industry Income—1950

(From Sales of Products Delivered—Estimated)

Complete Aircraft and Parts	$2,150,000,000
Other Aircraft Company Products	65,000,000
Aircraft Engines and Parts	50,000,000
Other Engine Company Products	12,000,000
Total	$2,277,000,000

Industry

Must Outdo World War II Achievements

Production Increase During 1951 May Exceed Any Previous Record

fighter in the Kansas City, Kans., plant presently used for Buick, Oldsmobile and Pontiac assembly. This plant was used by North American Aviation, Inc., during World War II for B-25 Mitchell bomber production. The speedy fighter will be powered by the Armstrong-Siddeley Sapphire turbojet engine recently licensed to Curtiss-Wright Corp.

Studebaker Corp. will build an unannounced turbojet engine.

Kaiser Automobile Co. will build the Fairchild C-119 Packet cargo and paratroop transport in its huge Willow Run plant, occupied during the war by Ford building Convair B-24 Liberator bombers.

Ford Motor Co. will build the giant Pratt & Whitney R-4360 Wasp Major 28-cylinder, 4000-hp reciprocating engine used in the Boeing B-50 and Convair B-36 bombers and all large transport planes.

In a move along somewhat similar lines, the Government has completed plans for Douglas Aircraft Co. to build the sleek Boeing B-47 Stratojet bomber in the wartime plant near Tulsa, Oklahoma in which it produced Convair B-24 Liberator bombers and its own A-26 Invader light bomber.

These are but the initially-approved plans in this direction. The Department of Defense has no less than 75 major airframe, engine and propeller plants under its cognizance for such expansion. These include 36 plants wholy-owned by the government, many of them currently unoccupied by other than storage items (such as giant food surpluses), and 39 plants in the so-called Industrial Reserve, which consists of plants that have either been sold or leased with a recapture clause permitting the government to retake possession in the event of a national emergency. Thus, the facilities are available for at least a threefold increase in aircraft production without the necessity for the plant construction that hampered the World War II expansion program. There is general agreement, however, that a full five-fold increase in production will require additional construction.

Like so many White House statements, it is difficult to discover the source of President Truman's flat statement: "Within one year we will be turning out planes at five times the present rate of production, ..." Washington observers believe that his assistants simply noted that the present procurement budget is roughly ten billion dollars, compared to something over two billion last year and, from this, arrived at the statement in his speech announcing the national

Aircraft Production—1950

Month	Airframe Weight, lb			Transports	Personal	Total Civil	Value, Civil Aircraft
	Military	Civil	Total				
January	1,456,400	507,800	1,964,200	10	157	167	$12,103,171
February	2,829,200	396,400	3,225,600	8	217	225	7,910,892
March	2,764,200	394,600	3,158,800	4	322	326	5,732,000
April	3,431,800	422,300	3,854,100	7	322	329	6,389,000
May	3,089,300	494,200	3,583,500	7	370	377	7,809,000
June	3,141,300	545,500	3,686,800	11	358	369	9,381,000
July	2,437,200	453,500	2,890,700	9	311	320	6,580,000
August	3,490,200	512,100	4,002,300	14	331	345	7,884,000
September	3,828,800	498,000	4,326,800	12	286	298	8,083,000
October	3,179,700	328,000	3,507,700	6	189	195	5,093,000
Total 1950 (estimated)	35,000,000	5,000,000	40,000,000	10	3,150	3,250	$86,000,000

Aircraft Industry Must Outdo Itself

emergency. To award contracts to the aircraft industry some five times as large as those presently held might be called a "five-fold increase" in the industry's backlog, but its rate-of-production is a far, far different thing.

There are several essential considerations in assessing the nation's ability to increase aircraft production rapidly. Following the announcement by President Roosevelt of his 50,000-plane goal in May, 1940, the industry was able to triple output in a 12-month period and to continue to triple its production every year until its peak was reached in 1944. Since World War II, however, the average airframe weight of military aircraft has exactly doubled, reflecting not only the increased size of our bombers and cargo planes but the heavier weight of fighters as well. (The new Lockheed XF-90 penetration fighter actually weighs more than the Douglas DC-3 transport plane.) This means that, assuming everything else equal, it would require two years and not one to triple aircraft production today.

There has been an enormous increase in the complexity of the modern combat airplane. Fighter cabins are now pressurized, air-conditioned and cooled; seats are designed for ejection by powder charges—including automatic canopy ejection, parachute opening at predetermined height, etc.—gas turbine engines are automatically controlled for variations in altitude, speed, and temperature; most instruments are remotely-indicating; automatic navigational and landing aids are incorporated even in fighters. Fabrication is substantially more complex with 75ST largely replacing the 17 and 24ST of World War II; skin gages have increased from less than one-tenth in. to an average of nearly one-half in.; precision forming is now required because of these stronger, thicker sheets and this prohibits hand-bending and fitting on assembly, as was common in World War II. All of these things mean more and more manhours per airplane.

Costs have risen astronomically since World War II. The typical World War II fighter cost shrunk to a low of $5.00 per pound in vast quantity production; a current typical jet fighter in quantity production costs $45 per pound and a new experimental Navy jet fighter, now entering production, will cost $98 per pound. These astonishing cost increases are a reflection of the well-known rise in labor and material costs to only a minor degree; by far the major portion of these increases are a product of the increased size and complexity of modern combat aircraft. These things mean that the current $10 billion in procurement monies will buy something like 10 per cent of the number of aircraft obtained at World War II levels.

Rosie the Riveter is a long way off in the current expansion program. Despite the rapid gains in employment currently being registered, these new employes are, almost without exception, experienced World War II workers returning to the fold or experienced metal workers from closely-allied fields. While the time may yet come when laymen are hired off the street and trained quickly for routine fabrication work, it is assuredly not yet nor for many months to come. At the moment only well-qualified and experienced workers need apply.

The Government approach to the problem of increasing aircraft production, which, of course, determines its rate of expansion and its efficiency in that expansion, currently involves typical paradoxes. Federal Wage and Hours and Walsh-Healey Laws place

(*Turn to page* 120, *please*)

Aircraft Engine Production—1950

Month	Horsepower			No.	Value	
	Military	Civil	Total	Civil	Civil Engines	Engines and Parts
January	4,181,300	140,500	4,321,800	267	$1,803,547	$5,311,071
February	3,935,800	101,100	4,036,900	210	1,262,191	4,206,892
March	4,861,400	133,600	4,995,000	359	1,724,000	5,678,000
April	4,032,600	153,200	4,185,800	480	1,733,000	4,700,000
May	4,320,100	167,900	4,488,000	337	2,143,000	6,007,000
June	4,654,400	173,800	4,828,200	434	2,015,000	5,544,000
July	4,476,700	143,100	4,619,800	378	1,748,000	5,267,000
August	4,763,700	98,700	4,862,400	392	1,048,000	4,341,000
September	4,431,500	118,600	4,550,100	415	1,264,000	4,342,000
Total—1950 estimated	52,500,000	1,500,000	53,000,000	4,000	$18,000,000	$50,000,000

Cranbrook four-door sedan.

Plymouth's '51

Styling and Mechanical Improvements

NEW qualities in driving and riding ease feature the 1951 Plymouth cars. The styling lines have been changed by a new grille, redesigned front fenders and hood, a wider windshield and a larger rear window. Narrower windshield pillars together with the wider windshield provide additional lateral vision.

Among the numerous mechanical improvements are electrically-operated windshield wipers of the single-speed, self-parking type. A unique pressure-vent radiator cap, which has been added as standard equipment, permits the cooling system to operate at atmospheric pressure during normal driving conditions. Under high-load, high-temperature driving conditions, it provides a pressurized cooling system to allow high coolant temperature without boiling or loss of anti-freeze.

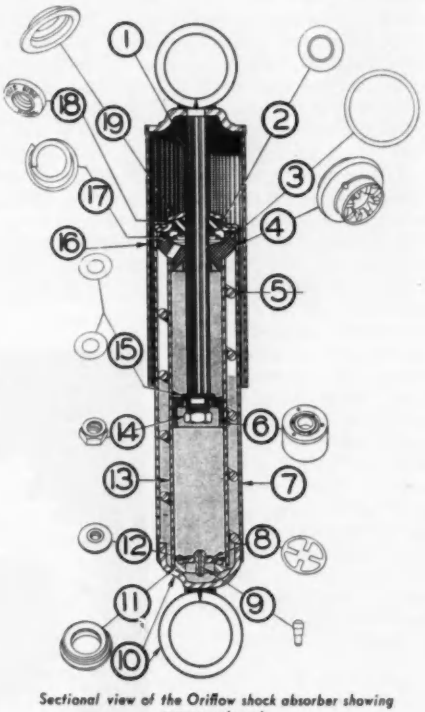
All Plymouth engines now have a built-in by-pass cooling system which consists of a passage in the cylinder head and block providing direct access to the water pump, and a choke-type thermostat to regulate coolant flow to the radiator. The generator output has been raised to 45 amperes, an increase of five amperes.

The instrument panel features a more convenient grouping of panel controls, newly shaped instruments, and improved coloring and lettering.

There are nine body-types in the new Plymouth line: the Concord series includes a two-door sedan and a three-passenger coupe as well as the two all-metal utility models, the Suburban and the Savoy; the Cambridge series has a four-door sedan and a club coupe; and the Cranbrook series includes a four-door sedan, a club coupe, and a convertible club coupe.

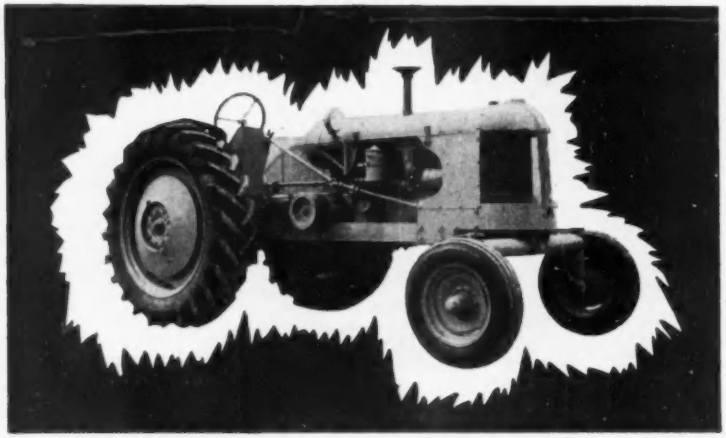
The Suburban and the Savoy are all-purpose vehicles. While they have the appearance and comfort necessary for family sedans, they are easily converted into cargo

(*Turn to page* 104, *please*)



Sectional view of the Oriflow shock absorber showing component parts.

1—Piston rod, 2—Seal retainer, 3—Oil seal gasket, 4—Rod guide, 5—Baffle, 6—Piston, 7—Reservoir tube, 8—Check valve spring, 9—Check valve orifice, 10—Ring and cup assembly, 11—Check value seat, 12—Check value, 13—Cylinder tube, 14—Piston nut, 15—Compression relief valves, 16—Dust shield, 17—Oil seal spring, 18—Piston rod oil seal, 19—Oil seal cap.



The Global tractor, a late model, Diesel-powered unit manufactured by Huber Mfg. Co. for export trade.

By
H. E. Everett

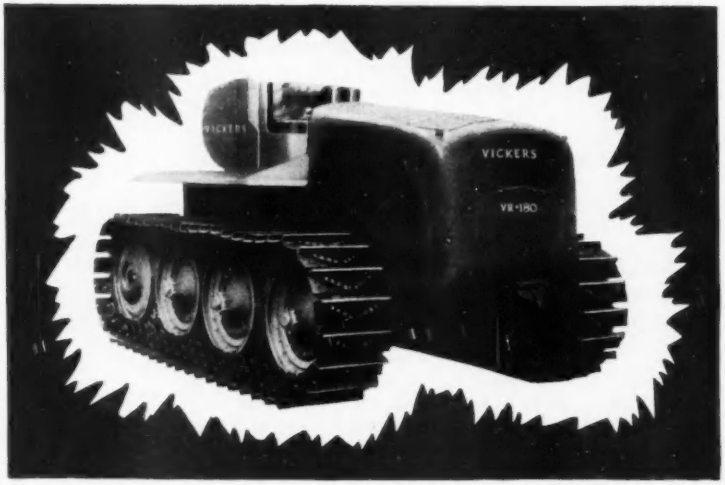
Vice Pres. and Editor,
Implement & Tractor

CONTINUING to face a market greater than it has been able to supply at any time during the postwar period, the tractor industry is starting 1951 confronted with two known hurdles—materials and manpower—and the possibilities of additional ones in the form of governmental controls. The market, for farm units at least, will be substantially expanded by the acreage increases which will be necessary for attainment of the food and fiber production goals now being established for the various crops by the U. S. Department of Agriculture.

With respect to materials, the supply of which has been inadequate throughout the postwar years, present inventories will permit most companies to continue their present level of operations throughout the first quarter. Deliveries during this quarter for later production are less certain. About 20 per cent of present inventory has been procured through conversion deals, although some companies have gone as high as 40 per cent. Steel through such sources costs about twice as much, and not all of the increase is being passed on. Rolling mill space for conversion arrangement is becoming tighter, and is likely to preclude any expansion in this source of supply.

The tractor and farm equipment industry during 1950 used 2,760,000 tons of steel, a monthly average of 230,000 tons, approximately 3.8 per cent of the nation's annual finished steel production. In view of the increases in crop production for this year the same amount at least will be needed. The Farm Equipment Institute, which represents 75 per cent of the industry's total production, has declared itself in favor of a "free materials market with equitable free distribution of materials to all manufacturers who are a part of the industry, whether large or small."

A statement, requesting such consideration, recently was presented to the U. S. Department of Agriculture, claimant agency for the industry's materials supply, the Department of Commerce, the National Security Resources Board and the National Production Authority. It did not, however, close the door to



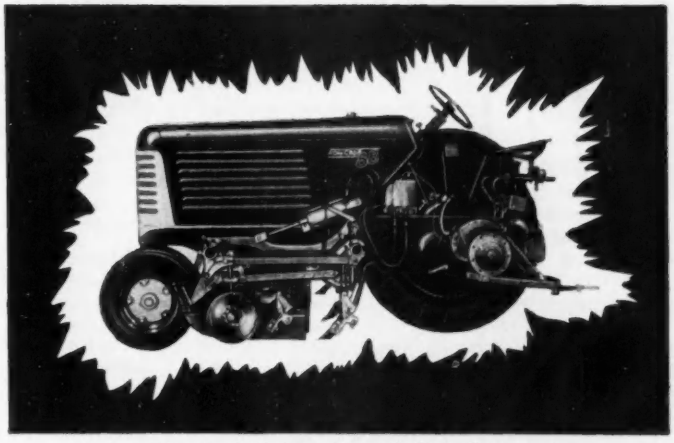
Vickers tractor Model VR-180 which will be produced by Vickers-Armstrong and Rolls-Royce for export.

Tractor Demand

to Continue Heavy in '51

later priority ratings should tightening conditions justify.

The manpower situation may eventually produce more grief than will materials. Present employment is virtually back at its postwar peak, following some late 1950 work stoppages in leading plants. Two major companies have recently been awarded some military contracts, one for tanks and another for prime movers and others are expecting considerable military production. These will not require any of the present facilities for manufacturing tractors or other farm equipment, but will use new plants and facilities which governmental agencies will provide. Both, however, are in areas of tight labor supply as are most of the industry's plants, and the extent to which they will draw from the manpower now engaged in tractor production is being viewed with considerable concern.



Oliver 88 equipped with electrically-controlled hydraulic power unit.

Also, as more and more military production is superimposed upon present industrial operations, will manpower be taken from the tractor industry? War industries can be expected to provide more take-home pay, through overtime, etc. On the other hand, workers now have pensions and other benefits in present employment which they did not have during the late war and which they may hesitate to forsake for temtorary advantage. There is also the hope that reduced employment in the less essential civilian industries will provide a greater supply for the military and the more important non-military plants.

During 1950 the industry produced approximately 525,000 farm tractors, which was about 30,000 less than in 1949. Slight declines are estimated in the production of both tracklaying and garden types. Strikes are estimated to have taken a production toll of approximately 50,000 farm units during the year, only a nominal percentage of which lost production was recovered through overtime operations later in the year. All plants of International Harvester were struck for a 10-week period, while Deere & Co. major tractor plants at Waterloo and Dubuque, Iowa, were closed for a longer period. Less publicized was a strike of nearly six months in Oliver's tracklaying plant in Cleveland. Some other plants were either slowed down or entirely closed for short periods, awaiting component units or other materials from suppliers.

Announcements of new tractors were comparatively few during 1950. Several current models were equipped for operation on LP fuels, and considerable increase was noted in the production of Diesel tractors previously announced. Hydraulic systems for control of tractor-operated implements were either further developed where previously provided or added as standard equipment by all major manufacturers. The implement designers however had an active year in providing improved power tillage and harvesting equipment. There was an increase in the production of self-propelled units which provide major machines with power units and transmissions to become virtually specialized tractors. A new development, a self-propelled unit which can be equipped with grain combine, corn picker or forage harvester, changing from

(*Turn to page* 146, *please*)

Production Development

of a Jettisonable

Fuel Tank

By A. H. Petersen
Production Design Engineer
Lockheed Aircraft Corp.

General view of press and drawn half shell.

THE problem of extending the range of modern aircraft is, due to present world conditions, one with which all aircraft engineers are wrestling today. A case in point begins with the remarkable performance of the Navy P2V Neptune, "Truculent Turtle," in bridging the gap between Australia and this country in 1946, a total of 11,236 miles nonstop. Naturally, anything short of this achievement as a usual requirement for this airplane today is looked upon as a direct challenge to the ingenuity of the Navy Department and the designers and builders of the airplane, and Lockheed Aircraft Corp.

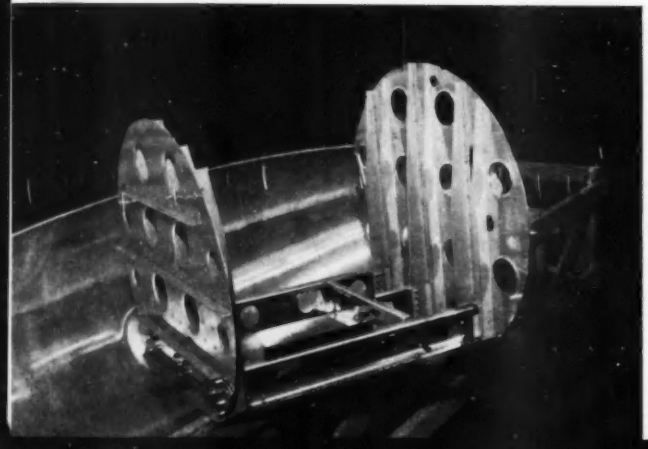
As always, the wing tips become a target when the search begins for places to put the necessary tanks for carrying added fuel capacity, and there was no exception in the case of the Neptune. The problem was aggravated, however, by the tight aerodynamic requirements which made the optimum in smooth external surfaces mandatory. Production schedules and a lack of adequate fabricating equipment usually require that tanks be assembled from a large number of component parts. This has made it difficult to give sufficient consideration to drag and instability which may be imparted to wing tips in certain attitudes.

The average designer compromises as a rule on the lightest skin possible and takes out the load in the internal structure. If his factory has limited facilities, the skins are broken down into a number of pieces and the more pieces, the more complex the splicing problems and internal structure.

The designer's choice of materials is limited since corrosion must be avoided at all costs. Internal members must not be protected with coatings which can peel, crack or dissolve due to the action of aromatic fuels. Dissimilar metals must be insulated. Sloshing compounds are difficult to handle on large tanks, while the use of spray type sealing compounds require a number of access openings which in turn present more sealing problems and add weight.

The job of designing and building a

(*Turn to page* 108, *please*)



Subassembly of main bulkheads, stiffeners, and longitudinal supports ready for installation in half shell.

Buick's New Bodies

By Joseph Geschelin

BUICK enters the 1951 season with entirely new bodies on the Series 40 models. A two-door convertible and Riviera now have been added to this series. The Series 40 also makes available the following bodies not offered by Buick heretofore: Two-door, three passenger, Tourback business coupe; two-door, six passenger Tourback coupe; two-door Tourback Sedanet; and two-door deluxe Tourback Sedanet.

Except for certain items of interest to be noted later, the major mechanical elements remain unchanged. The 263 cu in. displacement engine introduced on the 1950 Super line now becomes standard equipment on the Series 40, dropping the former Special engine. Actually Buick will concentrate on the production of just two engines—the 263 and 320—in 1951.

In line with shortages of critical materials, it is of interest that cast iron pistons will be installed in Series 40 engines when used with syncromesh transmissions. All other engines as well as Series 40 Dynaflow powerplants will continue with aluminum pistons.

The 1951 models have been given entirely new decorative treatment for exteriors—new moldings, gravel shields, radiator grille, bumpers and other details. For 1951 the unique combination bumper and grille first introduced on the 1950 Special has been discontinued. Although the grille still retains individual vertical stampings attached to the main bumper bar, the grille section now is mounted protectively behind the bumper.

Interiors too have undergone touches of fresh and attractive treatment, including a variety of trim options on all models.

E-Z-Eye glass, introduced last year, is made available at extra cost on all models. It comes in both laminated safety plate and tempered safety plate, both being used in appropriate locations and meeting all requirements of the safety glass code.

The hood emblem is new in design and has a space around it to permit air to enter the hood compartment from the front.

Double Foamtex rubber seat cushions and Foamtex rubber pads for seat backs become standard equipment on Series 70 models.

Another feature is the adoption of a temperature control indicator when heater and defroster equipment is

(*Turn to page* 124, *please*)

Here is a close-up of the brake for Series 70 cars, showing arrangement of segmented brake lining sections.

Special Deluxe four-door sedan Model 41D.

Rapid Riveting

Cuts Costs in Half

As seen in this illustration, the ram of the press is not directly connected to the riveting punch. This simplifies alignment and reduces set-up time in mass riveting motorcycle sub-assemblies.

HIGH speed assembly of various sprocket drive combinations for motorcycles, by the use of mass riveting on a hydraulic press, is being performed by the Harley-Davidson Motor Co. This method, reportedly, improves riveting results and has cut scrap losses to less than ½ of 1 per cent on 20,000 units per year.

The press is tooled for use on several similar riveting jobs, and fixtures can be changed in a few minutes. This is an important time saver since six different sets of fixtures are now in use, with others planned for the future. Rear wheel sprocket and brake drum assemblies for the twin-cylinder motorcycle models consist of the sprocket, brake drum and dust ring. Sprockets

(*Turn to page* 138, *please*)

Liquid Blasting Saves Die Polishing Time

THE development of a new application of liquid blasting to remove heat-treating scale and discoloration from forging dies has reduced the time required for die polishing by 10 per cent at Rockford Drop Forge Co., Rockford, Ill., according to L. C. Olson, superintendent.

Hydrofinish is the name applied to the method developed by the Pangborn Corp. for the liquid blast cleaning and finishing process. In this process, the surface is blasted with a high velocity stream of nonmetallic abrasive particles suspended in an aqueous solution. As the suspension is delivered to the nozzle by a circulating pump, velocity is imparted by compressed air.

The 10 per cent reduction in the time required to clean and finish new dies results from the elimination of hand polishing for deburring and the removal of heat-treat scale and discoloration and smoothing up the whole job. The method commonly used requires hand polishing to remove the scale and clean up the die cavity *after* heat treating. The new method of cleaning the dies permits all

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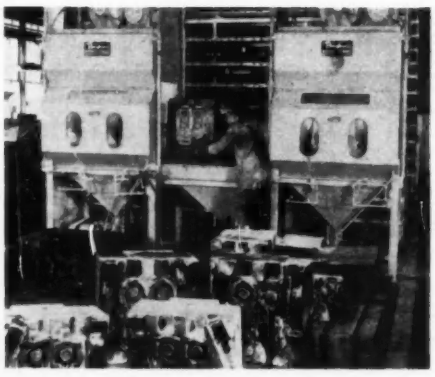


INLAND DATA for STEEL USERS

INLAND STEEL CO.

38 S. Dearborn Street, Chicago 3, Illinois

The role of Scrap in Steel Making

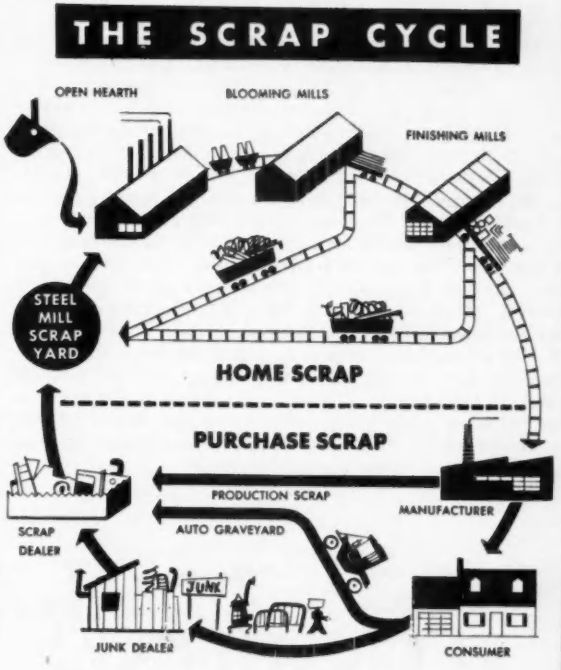
One of the most important raw materials in steelmaking . . . one frequently underrated by the casual observer . . . is iron and steel scrap. With over 90% of all the steel in the U. S. being made by the open hearth process, the scrap used by steel producers totals approximately 50,000,000 tons each year.

The open hearth method of steel production is geared to a pig iron scrap consumption ratio of roughly 50-50. This is to the final advantage of the steel user, since a large scrap diet in steelmaking results in a number of benefits: (a) steel is made faster (since scrap has already been "refined" once before, the "melt" time in the open hearth is decreased); (b) vital raw materials are conserved (it takes almost 4 tons of iron ore, coal and limestone to make a ton of pig iron); (c) unless scrap prices are abnormally high, the price of steel is cheaper; (d) steel is of higher quality (since scrap has already undergone one refining process); (e) transportation facilities, instead of being used for the additional raw materials otherwise required, can be released for other uses; (f) steel mill capacities can be expanded more readily with less emphasis on the blast furnace and more on open hearths and rolling mills.

About two-thirds of the scrap consumed in making steel comes from the steel mills themselves. Crop ends and sheared edges move quickly back to the open hearth shop. The remaining third, flowing to the mills largely through the 6,500 scrap dealers in the U.S., comes from the wastage in metal working plants ("production" scrap), auto graveyards, old building, bridge and ship wrecking projects, railroads (worn rails, freight cars, etc.), neighborhood junk peddlers.

The scrap dealers must sort the scrap so that the undesirables are eliminated, the alloys segregated and the right kinds of scrap can be delivered in large tonnages to the mills for most efficient steelmaking practice.

Today, with steel production at record peaks and with capacity continually expanding, it is more important than ever to keep scrap flowing back to the steel mills from *every* source. Everyone waiting for steel can help himself by assisting the movement of his scrap through his regular channels.



Hot Lacquer Spraying Problems Solved

By James A. Bede
President, Bede Products Co.

EVERY organic finish—lacquer, synthetic or whatever it may be, is affected by temperature variations. Each one has some one ideal temperature at which it is best applied, and once this ideal temperature is ascertained, the hot spray process enables spraying constantly at this one ideal temperature. The variations and inconstant conditions caused by fluctuating temperatures are eliminated once and for all.

The following actions take place when hot spraying is properly adopted: The viscosity of the lacquer is greatly reduced by heat, eliminating the need for some of the thinners; a uniform condition of operation is established and the lacquer will always have the same temperature and the same viscosity, eliminating the fluctuations that we now normally experience; in the process of atomization, a greater amount of the solvent is dissipated, so that lacquer of higher solid content is deposited on the work.

The major benefit of the hot spray process is the elimination of a large portion of the waste encountered with the normal method of spraying. Spray painting is a very inefficient process when we consider the tremendous waste inherent with the operation. Because it is the fastest and cleanest method of painting, the common tendency is to phlegmatically accept or ignore the waste involved. Hot spraying partially reduces this waste because it lowers viscosity with heat, in effect substituting heat for thinners. This enables depositing more solids with less solvents, with less spraying time and with less paint loss due to overspray. This is true for all types of finishes, but let us see what specifically happens with lacquers.

For an average cold lacquer, to reduce one lb of solids to a sufficiently low viscosity so that the spray gun can properly atomize it, the addition of four lb of solvents is required. In other words, in a five gallon mixture four gallons are solvents and the rest solids. Of course, the solvents are simply a convey-

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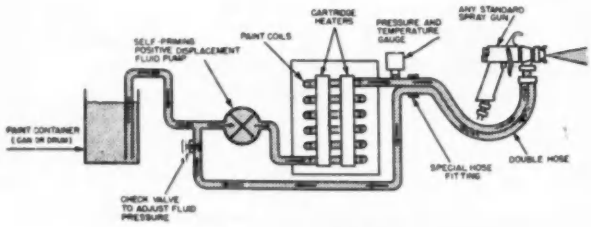
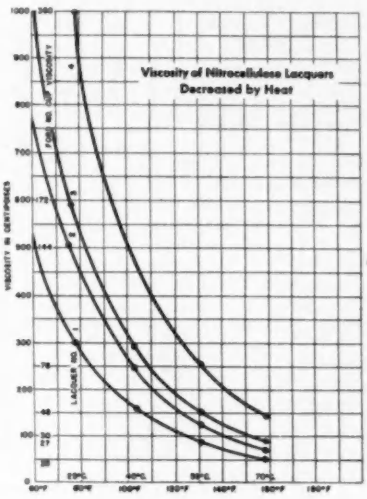
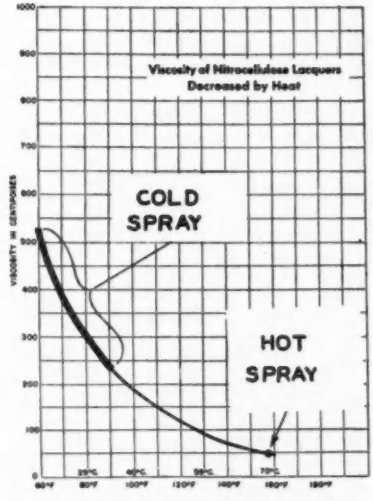


Typical hot lacquer system.



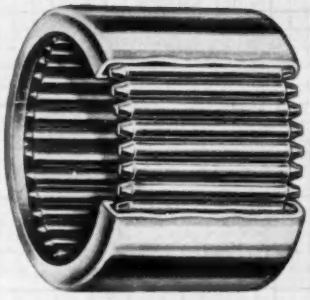
Graph showing decrease in viscosity of several lacquers as temperature is raised. (Courtesy Hercules Powder Co.)



This graph shows comparison in viscosities between cold and hot spray.

TORRINGTON NEEDLE BEARINGS

stand up in rugged service



A full complement of small diameter rollers spread radial loads evenly over a large area, roll easily under the shock. This feature gives Torrington Needle Bearings a higher capacity in proportion to their size than any other anti-friction bearing, and assures long, satisfactory service life in the toughest applications.

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Machining and Hardening

in the Same Setup

EXPERIMENTAL production at the Ford Mound Road plant is hastening the development of an interesting technique promising some noteworthy manufacturing economies. The setup for producing universal joint bearing races and flanged bearing races on eight-spindle Conomatics is fitted with an induction hardening attachment, making possible not only the machining of these parts directly from bar stock but selective hardening as well in the same cycle. In essence, the work is completely machined at six stations, induction hardened at the seventh, and cut off at the eighth position.

By Joseph Geschelin

Not only does this method promise improvement in overall economy, it also simplifies the production of parts, eliminates a number of secondary operations as well as copper plating and selective carburizing, together with the equipment required for these operations.

The universal joint flanged bearing race, illustrated here, made on a 2¼-in. eight-spindle Conomatic is being tooled for an anticipated net output of 113 pieces an hour. The simpler plain universal joint bearing race, made on a 1⅝-in. 8-spindle Conomatic, should be produced at a net rate of around 170 pieces an hour.

Both parts are made of SAE 1144 steel, the flanged part being produced from form-rolled bars. The specified hardening pattern is said to be perfectly controllable and reproducible, the range in hardness being from 56-61 Rc. The hardening cycle is about 2.3 seconds for the flanged bearing, 1.7 seconds for the plain bearing.

In the original method, these parts were first copper plated for selective carburizing and later machined to remove the excess plate and to grind the bores. In the new method the bore becomes the controlling element of the work piece by reaming to close limits. Actually the bore is held to 0.7367-0.7377 in. and no further work is required after hardening, although in the previous method it was necessary to grind it. The parts are reamed in the fourth position, the latest development being the adoption of a cemented-carbide-tipped reamer which is showing a life of around 4000 pieces between grinds.

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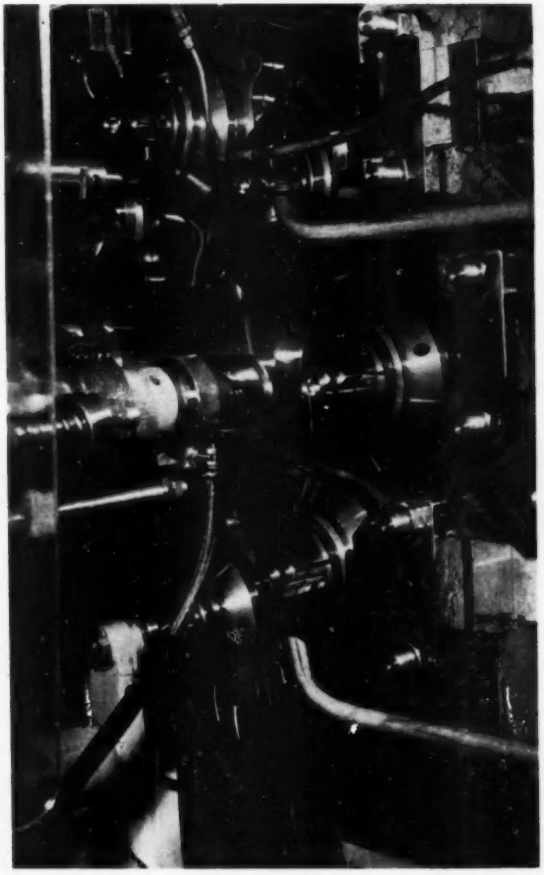
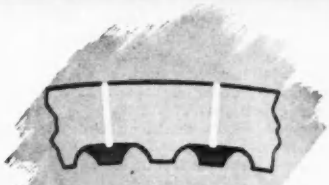


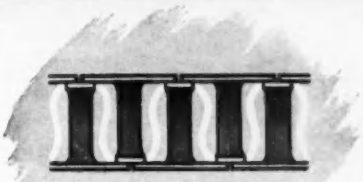
Closeup of work station of a 2¼ in., eight-spindle Conomatic tooled for producing flanged bearing races. Induction hardening is done at the station in the center at the extreme right. The coil is enclosed, as may be seen here, with coolant led in through the tube coming up from the base of the machine.

"Flexline..."

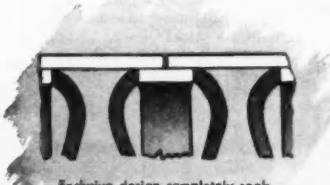
A REMARKABLE NEW DEVELOPMENT IN Oil-Control PISTON RING DESIGN!



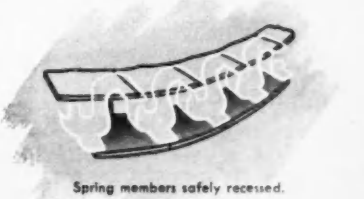
50 segments actuated by 100 springs assure equal outward pressure and flexibility.



"Straight through" openings drain oil freely from front to back.



Exclusive design completely seals gaps between segments.



Spring members safely recessed. Unaffected by wear.

Formed out of a single ribbon of flat steel, Muskegon's new "Flexline" oil-control piston ring is amazingly flexible, with a closed joint, and derives its outward pressure from the circumferential arrangement of its segments. This remarkable new "Flexline" design provides exact conformity to cylinder irregularities . . . eliminates dip flame . . . prevents clogging . . . resulting in greatly improved oil economy and longer life.

SEND FOR ENGINEERING BULLETIN!

MUSKEGON Piston Rings

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PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

NEW PRODUCTS for AIRCRAFT

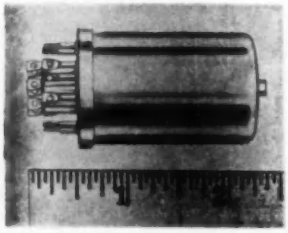
FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 60

R-4—Hermetically Sealed Miniature Relay

A new aircraft type, hermetically sealed miniature relay, said to incorporate a unique combination of size, weight, shock resistance and temperature range characteristics, has been developed by the Hart Mfg. Co., Hartford, Conn. Claimed smallest and lightest of its type, the new "Diamond H" 4-pole double throw relay is built to withstand shocks up to 50 "G" and to operate in temperatures ranging from —65C to +200C.

Displacing 1.5 cu in. and weighing 3.5 oz sealed with a dry, inert gas, pressure filled, the relay has variable mounting arrangements. Virtually innumerable variations are possible in the basic specifications for voltage, amperage, number of poles and temperatures.

Contact ratings are 2A, 28V, D.C.; 2A, 115V, A.C., 400 cycle. Overload rating is 12A, 28V, 20 sec; coil resistance

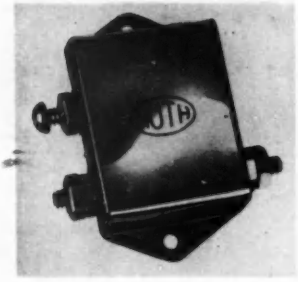


Hart hermetically sealed miniature relay.

300 and 150 ohms; coil voltage 28V, D.C., with 0.1 amperage. Terminal arrangements call for soldered connections, but plug-in terminals may also be obtained.

R-5—Midget Buzzer

For aircraft or electronic instrument applications the midget buzzer manufactured by the Auth Electric Co., Long Island City, N. Y., indicates many possible uses wherever a medium-intensity audible-tone signal is required, and wherever size and weight are at a premium. Designated as Model 1702-0, the buzzer has an overall size of 1⅝ in. by 1⅛ in. by ½ in., and



Auth midget buzzer for aircraft or electronic instruments

weighs 1½ oz. The buzzer operates on from six to 48 volts dc or ac, as specified. Equipped with phosphor-bronze springs and pure hard-drawn silver contacts, the buzzer provides variable volume and pitch by double locking adjustments.

R-6—Cup Type All-Metal Mount

A cup-type, all-metal, all-weather mount for aircraft and general industrial uses, available in four sizes—2½-6 lb, 5½-12½ lb, 10-20 lb, and 18-40 lb —is announced by Robinson Aviation, Inc., Teterboro, N. J.

This cup-type, Met-L-Flex mount provides performance and balanced equipment protection for sub-base mounting systems, with vibration isolation efficiency said to exceed government performance specifications, combined with excellent shock absorbing characteristics. An auxiliary Met-L-Flex element

Robinson cup type Met-L-Flex mount, Series 7002.

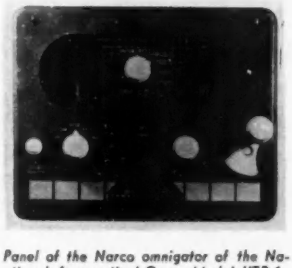
located in the base of the mount cushions overloads arising from landing shock, gunfire recoil and combat maneuvers. Series 7002 unit mounts have the structural strength required to meet the 30 "G" drop-test requirements of Specification AN-E-19.

The Series 7002 mounts offer uniformity of operation from —90C to 175C. Interwire friction reduces amplification at resonance and effects greater stability in the mounting system; environmental tolerance assures constant performance under all operating and service conditions; the drift rate, or permanent set, is declared negligible.

The Series 7002 unit mount is interchangeable with the No. 2 size, cupped-outside load AN8008 insulator.

R-7—Seven-Function Omnigator

The Narco omnigator, announced by National Aeronautical Corp., Wings Field, Ambler, Pa., combines all seven VHF functions in a single package panel installation as follows: Eight



Panel of the Narco omnigator of the National Aeronautical Corp., Model UTR-1

channel high power VHF transmitter; tunable VHF high performance receiver; VHF omni range navigation using standard instrumentation; VHF visual aural range navigation; tone comparison localizer approach navigation; phase comparison localizer approach navigation; and 75 mc marker beacon receiver.

The omnigator uses 23 tubes plus two selenium rectifiers and six germanium diode rectifiers.

The transmitter has a high power output and modulation in excess of 90

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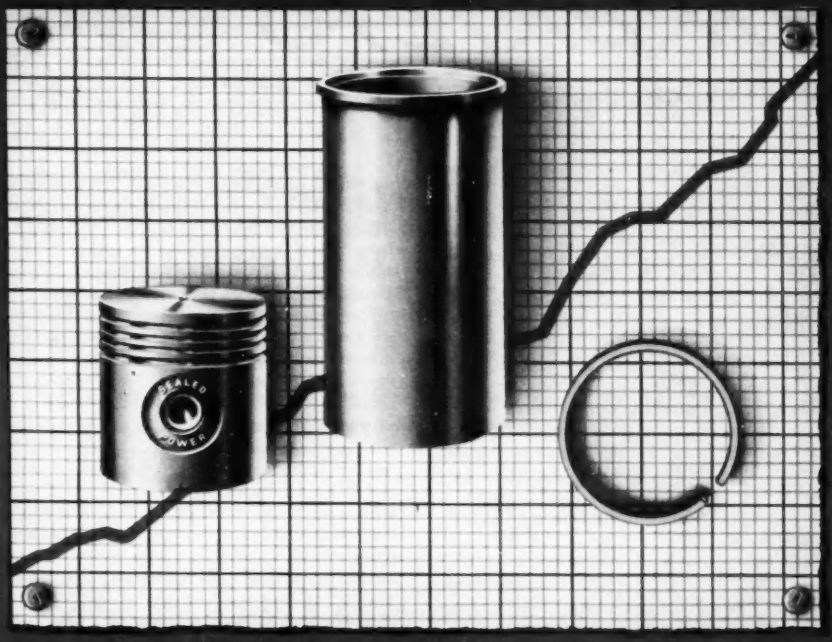

The unending search...

In a gratifying number of cases, the automotive engineer's search for higher quality ends at Sealed Power. But Sealed Power's search for higher quality never ends. Since 1911 we have been striving to build ever better piston rings, pistons, and cylinder sleeves. Your co-operation has made our present facilities the finest ever known in the industry. You are urged to use our full resources to help make your good engines even better.

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AIRBRIEFS

By ROBERT McLARREN

Kaiser Coup

The decisions of the administration to put Henry J. Kaiser into the shipbuilding business, the aluminum business, the steel business, the home-building business and the automobile business have now been followed by a decision to put him in the airplane building business. Armed with a $25 million RFC loan, Kaiser is now readying his Willow Run plant for the production of Fairchild C-119 Packet cargo and paratroop transports. The deal has left the aircraft industry flabbergasted and the Fairchild Engine and Airplane Co. absolutely speechless—yet there are none to protest.

Oddly enough it was Fairchild, among all the airframe manufacturers, who pioneered the post-war industrial mobilization planning and whose programming had proceeded longer and farther than any other company in peacetime preparation for rapid wartime expansion of production. Thus, of all the companies in the industry, Fairchild least needed assistance—from within the industry or without—to expand Packet production smoothly and rapidly. The airplane itself, a development of the C-82 Packet, was designed from the beginning for ease of production, for its fabrication by unskilled workers, and for its assembly from subcontracted parts shipped in to the main plant. The main plant at Hagerstown, Md., had been laid out and designed for rapid expansion of production, "phantom" orders had been assembled into bundles for immediate shipment to subcontractors who, in turn, had completed plans for participation in Packet production in the event of an emergency.

The final enigma of it all is that Kaiser promises a production rate of 20 airplanes a month beginning late this year—which is precisely the rate established at the Fairchild Hagerstown plant. Little wonder it is that the armies of engineers and workers who have devoted long hours over the past five years to the development of mobilization plans for the Packet now feel that it has all gone down the drain.

The Answer—At Last

Tongues were sent wagging last September when the Curtiss-Wright Corp. announced the purchase of production rights to the British Armstrong-Siddeley Sapphire turbojet engine. This engine produces 7200 lb of static thrust, more than the output of any U. S. turbojet engine so far publicly announced (but considerably less than the outputs available but still classified), but a figure well within the capabilities of current production engines. This seemingly illogical move posed two possibilities: either C-W was gambling blindly on a pig-in-a-poke or had substantial committments from the Armed Forces for production of the engine. During the ensuing months it looked as though the former possibility was proving the answer and that C-W had tossed an amount ranging up to $5 million to the wind. Now, however, the news comes that C-W is going into vast quantity production on the engine intended for production installation on the sleek, swept-wing Republic F-84F Thunderjet fighter. The airplane first flew last June and completed its preliminary tests rapidly and satisfactorily with an Allison J-35 turbojet engine of 5200 lb thrust. The additional power of the C-W Sapphire will give the airplane supersonic performance and render it a fighter to be seriously reckoned with in the future. The Air Force has enlisted the aid of the General Motors Corp. to mass-produce this new fighter at its Kansas City, Kan., plant.

Even a Congressional investigation could never ascertain whether on not Curtiss-Wright had the solemn promise of the Air Force to buy the Sapphire in quantities after C-W had purchased the engine, but the latter has certainly hit the jackpot—only three months after placing its bet.

Where It Goes

The newspapers have informed the American people that the Air Force will buy something over six billion dollars worth of airplanes in the current fiscal year—which sounds like an awful lot of airplanes. The trouble is the newspapers never bother to pursue the matter any further than that blunt six billion figure. It is of interest to see just how much of this money the aircraft manufacturing industry will actually receive.

Here is a breakdown: one-half of one per cent goes for procurement and production administration, one and one-quarter per cent for industrial mobilization planning, two and one-quarter per cent for guided missiles, 3.35 per cent for major modification and modernization, six per cent for electronics and communications equipment, 10.15 per cent for related aircraft procurement, thirty-one per cent for aircraft component spares and spare parts, and only 45.5 per cent for the procurement of complete aircraft. Of this three billion thus left, the airframe manufacturer receives roughly fifty per cent, about sixty per cent of which he spends

(*Turn to page* 130, *please*)

Where POWER FAILURE MAY MEAN DISASTER

SYNCHRO-START controlled Engine Generator-Sets will instantly provide a continuous flow of auxiliary power for the duration of the failure.

Within seconds after the main power fails, the **SYNCHRO-START CONTROLS** automatically bring in stand-by generator sets to provide emergency power. When the main service is restored, this same control stops the engine and resets itself for the next power demand.

Besides automatically Starting and Stopping the engine, our Model 1436 control protects the engine against any abnormal conditions while running — such as, low oil pressure, overheating, fuel or ignition failure, over-speeding and over-cranking, in which case it will stop the engine and signal an operator with visual or audible alarms and indicating lights in the control to show the exact cause of the trouble, should it ever occur.

SYNCHRO-START AUTOMATIC CONTROLS can be furnished for any model and any number of internal combustion engines used for any power application. Their use throughout the world for the past 20 years has proven their dependability, safety and economy.

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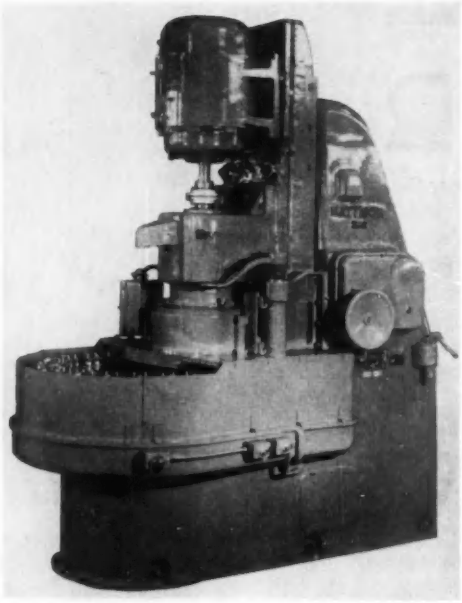
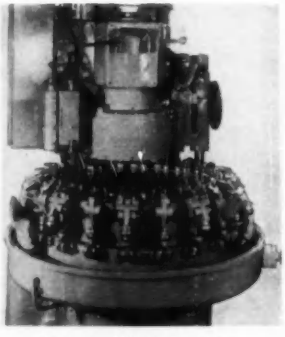


Mattison No. 24A rotary surface grinder.

B-5—Rotary Surface Grinder

A Mattison (Hanchett type) No. 24A rotary surface grinder with special fixture for grinding both ends of oil pump gear has recently been completed for one of the automotive companies by Mattison Machine Works, Rockford, Ill. There are two sets of stations—one for grinding one side and the other for grinding the opposite side. When one side is ground, the operator turns over the piece and the opposite side is ground. After both sides are ground, pieces are automatically ejected. Work is constantly checked by an automatic sizer which keeps all pieces within specified tolerances without operator's attention.



Close-up of Mattison grinder.

B-6—Gage For Classifying Critical Tolerances

A highly accurate Selectronic gage, designed to classify critical dimensions of precision parts for selective assembly, has been placed on the market by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. It permits broad production tolerances in the manufacture of parts such as balls, rollers, pistons and piston pins because it provides a selective control for precision fitting at the time of assembly.

Carbon vanes used in refrigerator compression units are an example where accurate interchangeable assemblies of minimum tolerances are demanded. Through this medium of Selectronic assembly a vane thickness tolerance of 0.0032 in. is allowed, with the gage automatically separating the vanes into 32 classifications in increments of 0.0001 in.

In this instance (illustrated), vanes are loaded into a magazine-feeding mechanism from which they are automatically fed under an Electrolimit gaging head and subsequently routed into the proper classification bin. The Electrolimit gaging head operates a photoelectric control unit which registers the size of the vane according to its thickness and directs it to the ejection chute and then to the classification bin.

Pratt & Whitney Selectronic Gage.

As each piece is gaged, an electric impulse passes through a commutator having 32 size classification segments, and this actuates the chute-positioning mechanism. Only one set of masters,

You gotta be GEARED FOR THE JOB!

Up grades, or through traffic, you gotta be geared for the job if you want to get there first with the greatest payload.

For with the *right* gear ratios your engine always turns at its most efficient speed. And that, of course, means higher average speeds, fewer shifts, less wear and tear on the entire power train, less driver fatigue—more profit at the end of the year.

From the 101 models in the proved line of Fuller Heavy-Duty Transmissions and Auxiliaries, you're sure to find the *right* combination to get more work, more economically, out of *your* engine.

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a minimum and a maximum, is needed to adjust the gage. Individual increment settings, adjustings and tuning are not required.

The company points out that Selectronic Gages are custom designed and built to meet demands of specific industrial applications.

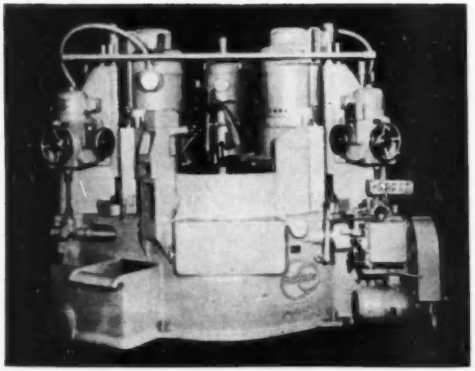
B-7—Rotary Table Surface Grinder

Developed by the Blanchard Machine Co., Cambridge, Mass., is a No. 16A3 vertical spindle rotary table surface grinder which can be equipped with a magnetic chuck 40 in. in diam, or a plain table, to accommodate a fixture to hold non-magnetic work or pieces of irregular shape. Maximum swing of work or fixture is 49 in.

All three abrasive wheels can be set to grind the same surfaces, when stock removal is heavy, or when very accurate tolerances for dimension or surface finish are required. One spindle can be set to grind a surface at the same or different height, at a different distance from center of chuck.

Photograph shows a grinder equipped with two spindles driven by 30 hp motors and one driven by a 15 hp motor. This grinder is equipped with a Blanchard designed and built 24 station fixture, arranged for automatic clamping and releasing, for grinding connecting rods with wrist pin boss at an offset height.

All grinding wheels are under the control of the Blanchard automatic caliper, or sizing device, which will, in ordinary practice, hold dimension variation within a total range of 0.001 in.



Blanchard vertical spindle rotary table surface grinder, No. 16A3.

B-8—Automatic Driller and Countersinker

A machine for speeding drilling and countersinking of cotter pin holes in clevis pins and screws, announced by the Govro-Nelson Co., Detroit, Mich., performs the operations of drilling the hole and countersinking both sides at the rate of 1500 pieces per hr. Fully automatic, it employs 4 model KH Govro-Nelson automatic drilling units operating simultaneously in conjunction with and completely interlocked with a Geneva type, 8-station indexing dial and a hopper part-feeding mechanism.

Govro-Nelson automatic machine for drilling cotter pin holes and countersinking both sides.

The part is first countersunk on one side by one drilling unit. Two units then accomplish the drilling in two stations, thereby reducing the drilling time per piece. The part is then countersunk on the other side by the fourth drilling unit.

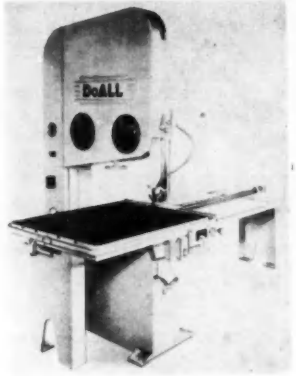
The machine stops automatically should a tool break or should a malformed part jam in the mechanism, and it will slow down automatically in case a tool becomes extremely dull.

The indexing mechanism cannot operate unless all of the tools are out of the work. Similarly, the drilling units cannot operate during the indexing.

B-9—Hydraulic-Feed Bandsaw Machine

The DoAll Co., Des Plaines, Ill., has placed on the market a powerful bandsawing machine HP-36 Hydro-Feed, with throat capacity of 36 in., and work height from 15-½ in. up. The machine uses standard saw bands up to 1 in. width. It features automatic synchronized hydraulic aircraft type breaks.

The HP-36 uses a 10 hp drive motor. It has a three-speed transmission and overload protected Speedmaster variable drive that gives a tool speed range of 40 to 10,000 fpm. The 40 in. by 48 T slotted hydraulic table supports work pieces weighing a ton or more. The table slides on 28 rollers distributed over a 36 in. by 87 in. bed. Table stroke is 36 in. with 200 lbs pressure available. Correct feed pressure is automatically controlled by the resistance of the work as the saw encounters changing material thickness. The infeed rate is controllable up to 18 fpm with quick return.



DoAll bandsawing machine HP-36 Hydro-Feed.

Other refinements include job selector dials and complete sets of guides for slow and high speed sawing, band speed and tension indicating dials, converging beam work light, chip blower and dust spout for exhaust connection.

The HP-36 is designed for heavy duty precision sawing, cutting thick sections

(*Turn to page* 78, *please*)

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and all at lower cost!

CAST alloy steel crankshafts

The lower cost of AUSCO Cast Alloy Steel Crankshafts is proved by mass-production car builders' experience, and cost records which are available to automotive engineers, on request. This saving is made possible by 15-year developed AUSCO methods, including a 75% reduction of operations, through elimination of cheeking, and freedom from warping, resulting from special heat-straightening processes. Other advantages attested by over 2,000,000 AUSCO Cast Alloy Steel Crankshafts in daily motor car use, listed below.

by AUSCO

A VOLUME OF EVIDENCE

of the cost-saving and other advantages of AUSCO Cast Alloy Steel Crankshafts awaits interested automotive engineers. This book of photographs, charts, test and performance records will be submitted in person on request.

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Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

A-12 Testing

Dy Chek Co.—Bulletin 500 describes the dye penetrant method of metal inspection, and shows how this chemical process is used for non-destructive testing.

A-13 Blast Cleaning

American Wheelabrator & Equipment Corp.—A new bulletin "Continuous Blast Cleaning Can Reduce Your Cleaning Costs" is now available. The eight-page booklet explains continuous airless abrasive blast cleaning and cites actual production figures for the five sizes of Wheelabrator Continuous Tumblasts.

A-14 Casting

Alloy Precision Castings Co. — An eight-page illustrated brochure gives informative engineering data on precision castings by the Mercast process. A pictorial story shows the step by step production of stainless steel aircraft parts by precision castings.

A-15 Strip Steel

Acme Steel Co.—Just off the presses is the first issue of "Confab," a quarterly magazine for users of strip steel products. The new publication replaces "Process News."

A-16 Lathes

The Lodge & Shipley Co.—Just recently released by the firm is a new pamphlet, "Chip Tips," that relates actual production experience with the company's line of lathes and Copymatic equipment. The machining of automotive rim rolls with a Copymatic lathe is described in the first issue.

A-17 Furnace Controlled Atmosphere

Leeds & Northrup Co.—To show how heat-treaters can now have full control not only over temperature and time, but over furnace atmosphere in such diverse applications as hardening, annealing, normalizing, carbon restoration, and carburizing to controlled surface carbon content, the firm has just published an illustrated, four-page catalog section (Cat. T-623, Sec. 1). It describes the new series H Homocarb furnace equipment, with recently-developed Microcarb control, which continuously and automatically regulates carbon content of the Homocarb atmosphere.

A-18 Broach Sharpeners

Colonial Broach Co.—A new, four-page catalog-bulletin, "Broach Sharpeners for Every Purpose," has just been released. It covers machines designed to solve broach sharpening problems—whether the broach is round or flat, oval or special in shape.

A-19 Portable Electric Tools

Buckeye Tools Corp.—A new catalog, featuring a complete line of 360-cycle and 180-cycle portable electric tools has just been issued. Drills, screwdrivers, grinders, sanders and polishers are illustrated and described, and complete specifications on every tool are included.

A-20 Air Devices

The Bellows Co.—A new 24-page, multi-color booklet, "Controlled - Air - Power," has just been made available. Its purpose is to give a new conception

(*Turn to page* 128, *please*)

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THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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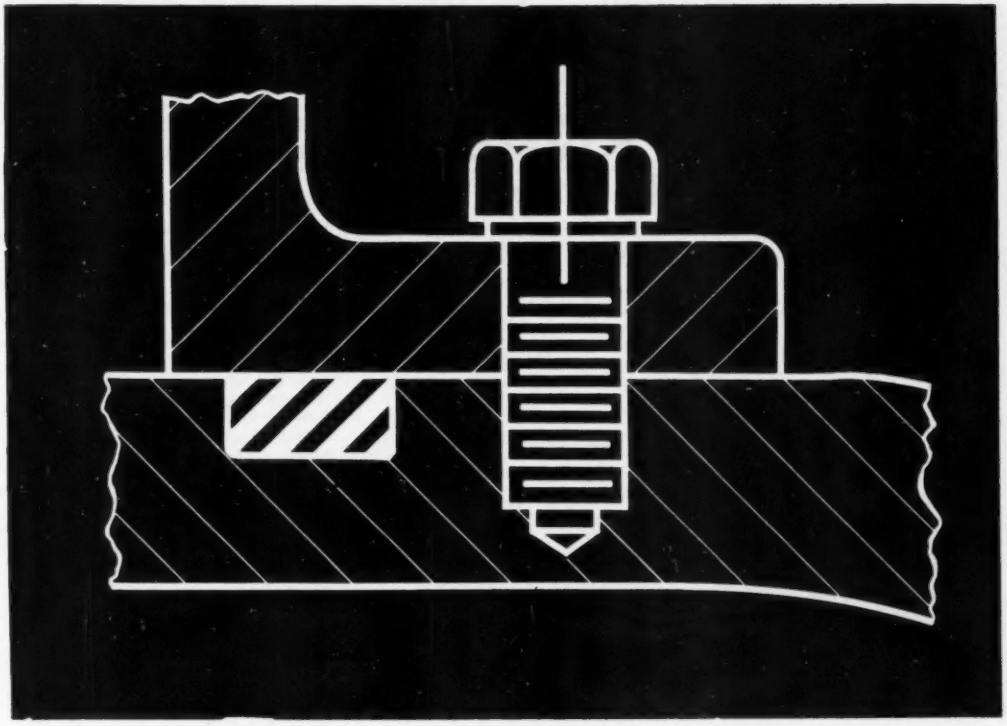

HOW TO DESIGN METAL-TO-METAL JOINTS FOR LOW-COST SEALING

The design of metal-to-metal joints often can be simplified to reduce the cost of both the joint itself and the gasket that will be used to seal it.

A typical metal-to-metal joint is illustrated above. Flange faces in such a joint must, of course, be finished to meet the tolerance requirements of the assembly involved. The gasket channel, on the other hand, need not be held to a close tolerance if a compressible gasket is used to seal the joint. Another saving possible when a compressible gasket is used is the elimination of a relief for sideflow or its alternative, a molded gasket.

On applications where cork is suitable, one of Armstrong's Cork Compositions will provide an effective seal at low cost. Cork can be cut to full channel width and up to twice channel depth. It will compress fully and allow perfect mating of the metal parts.

Where the properties of rubber are needed, the advantages of cork's compressibility can be had in one of Armstrong's Cork-and-Rubber Compositions. Unlike straight rubber compounds, cork-and-rubber compositions decrease in volume under load. Consequently, they provide nearly the same freedom in design and manufacture as does cork. Compressed within its recommended range, a cork-and-rubber gasket will not sideflow appreciably, and relatively wide tolerances are possible in both channel and gasket. For example, a cork-and-rubber gasket normally is cut to full channel width and, depending upon the composition selected, up to 1.25 to 1.50 times channel depth.

Where gasket quantities are to be large and gasket size permits, savings may be effected by designing the channel to accommodate lathe-cut rings, square or rectangular in section. These can be cut as small as 1″ O.D. to as large as 20″. In other cases, square or rectangular section cork-and-rubber ribbon may be used to advantage. Consult your Armstrong representative for sizes and lengths available.

For more detailed information on gasket selection and design, call your Armstrong representative or refer to Armstrong's Gasket Materials manual in Sweet's file for product designers. If you would like to have a personal copy of this manual, write to the Armstrong Cork Company, Gaskets and Packings Department, 1501 Arch Street, Lancaster, Pennsylvania.

ARMSTRONG'S *Gasket Materials*

NEW PRODUCTS

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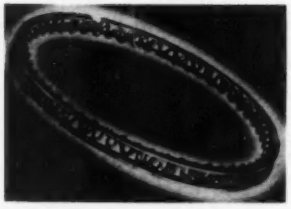
C-10—Oil-Control Piston Ring

At the ASI Show in Chicago, Wilkening Mfg. Co., of Phila. and Toronto, exhibited for the first time a new design of oil-control ring, the Pedrick



Pedrick Formflex CS8 oil-control ring.

Formflex, type CS8—said to be the first major improvement in multi-piece rings in the past 10 years. The new ring is claimed to be truly universal—suitable for use in new, re-sleeved, rebored, tapered, out-of-round, or distorted cylinders.

A feature is the radically-different expander, called the Equalizer. It is completely independent of groove depth, does not touch the groove bottom and delivers uniform radial pressure all around the ring circumference through tangential forces. These forces are set up by butting the ends of the Equalizer and compressing it into the cylinder. Conventional expanders deliver their force radially by pushing at a few points against groove bottom and ring.

The narrow faces of the two steel rails which contact the cylinder wall are plated with solid chrome. The spacer which holds the rails apart provides unusual oil drainage area. So also does the Equalizer.

This oil ring is said to be amazingly conformable in adapting itself to practically all conditions of cylinder wear and distortion. It is claimed by the company to have almost triple the oil drainage ability of other rings. The uniform tension provided by the new Equalizer affords less friction for the same degree of oil control, it is stated. Mechanics, it is said, no longer need be concerned about groove depth. Longest life is assured by the solid chrome plating on the rails.

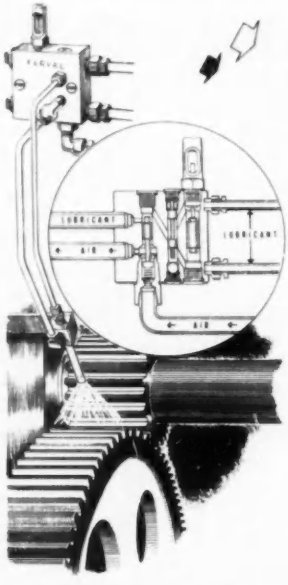
First engineered sets of the ring, in a new "A" series, will be for Buick. Others will follow for car and truck engines of Plymouth, Dodge, Nash, International, etc.

C-11—Spray Valve For Open Bearing Surfaces

By means of the new spray valve developed by the Farval Corp., Cleveland, Ohio, either grease or oil can be sprayed onto open gearing, slide surfaces, or any other area where a measured amount of lubricant at regular intervals is desirable. The spray valve can be operated wherever compressed air is available—either as an addition to a regular Farval Dualine lubrication system or in a complete system of spray valves, served by either a manual or an automatic pumping unit.

Compressed air from the supply line is directed through the spray valve, which meters air to the delivery nozzle as lubricant is metered. By a unique arrangement the lubricant valve also turns on and shuts off the air. Thus the quantity of air used is limited to the amount needed to spray each delivery of oil or grease, without exhausting or reducing pressure. Positive cut-off of lubricant by the Farval valve after each delivery eliminates bleeding and waste from the nozzle.

Through the use of properly selected supply line sizes for the lubricant from the pumping unit to the various spray valves in a system, a progressive spraying operation can be obtained which will not exhaust even a limited air supply, it is said.



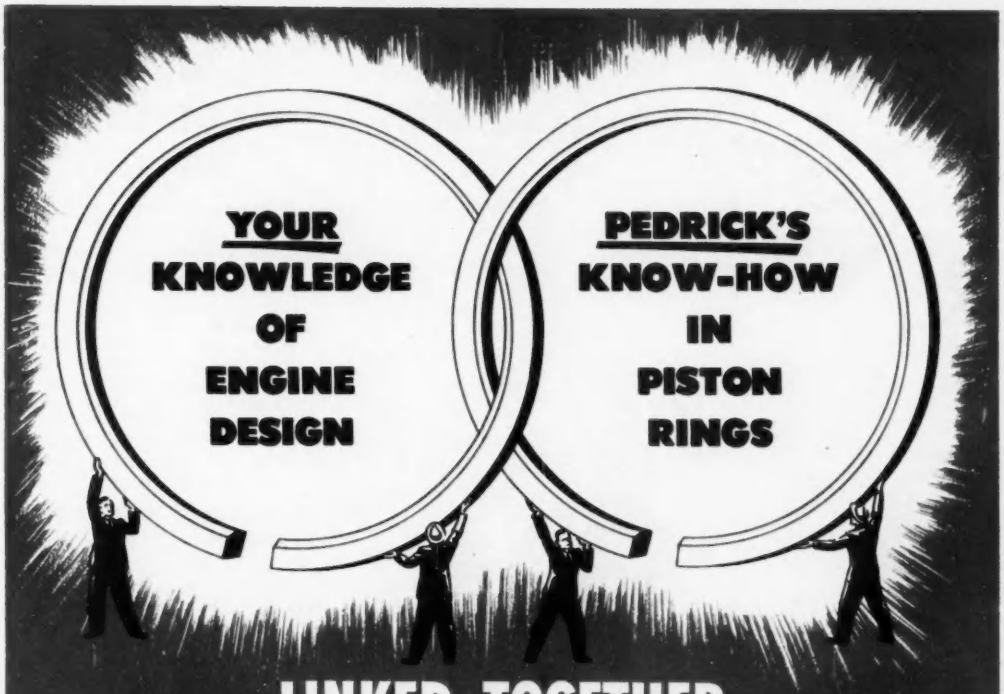
Farval spray valve for open bearing areas.

C-12—Radioactivity Detection Meters

A radioactivity-measuring instrument, the Universal Roentgen meter, being produced by Westinghouse Electric Corp., Pittsburgh, Pa., is the measuring part of radiation detection devices and reveals radiation, expressed in milliroentgens, that these devices detect, thus indicating the amount of radioactivity present in any area. A roentgen is the basic measuring unit of alpha, gamma, and beta rays, which may be produced by an x-ray machine, a piece of radium, or an atomic bomb explosion.

Westinghouse Universal Roentgen meter.

The Universal Roentgen meter is equipped with multiple scales, either four, five or six, which make possible fine readings in all ranges of radiation. The four scale model covers four ranges of radiation: zero to half a milliroent-



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for progress in engine performance!

With the experience and vision of your own organization . . . plus Pedrick's specialized knowledge of piston ring design . . . you have a team that can go far in achieving better engine performance.

Pedrick's contributions to ring design are a matter of record: the double-disc grinding method, centrifugally cast C90 special alloy, the narrower rings now recognized as more adaptable to varying engine conditions, the finest chrome-faced rings on the market, superior coatings, and, currently, a radically different ring expander.

These contributions have played a definite part in the development of today's advanced engines. If you have problems such as blow-by or oil control, where piston rings are a factor, Pedrick engineers are at your service. Write to WILKENING MANUFACTURING CO., Philadelphia 42, Pa. *In Canada:* Wilkening Manufacturing Company (Canada) Ltd., Toronto.

Pedrick®
"HEAT-SHAPED"
PISTON RINGS

FOR 31 YEARS, SUPPLIER OF PISTON RINGS TO LEADING VEHICLE AND ENGINE MANUFACTURERS

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grinding wheels

Production up . . . costs down . . . and rejects rare as a February heatwave. No wonder the grinding foreman is uplifted. And here's the reason. He's using grinding wheels exactly suited to his jobs. They're Simonds Abrasive Company wheels . . . part of a complete line including grinding wheels, mounted wheels and points, segments and abrasive grains . . . all accurately specified, rigidly tested and scientifically produced under complete quality control by Simonds Abrasive Company, a major manufacturer of grinding wheels for over 50 years. Write for free data book.

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

NEW PRODUCTS

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gen; zero to five milliroentgens; zero to 50 milliroentgens; and zero to 500 milliroentgens.

Setting a switch determines which of the multiple scales will operate and will be visible, thus eliminating incorrect reading by use of the wrong scale.

The instrument is sensitive enough for use in x-ray work, but also accurately measures large amounts of radiation encountered in atomic fission research.

C-13—Steam Spray Gun For Paint

Introduced by the Kellogg Division of American Brake Shoe Co., New York, N. Y., is a complete line of equipment for spraying paint with steam, including a new spray gun using superheated steam instead of compressed air.

The S-100 steam spray gun provides new insulation and radiation design features to dissipate the heat caused by the steam in the gun, and to enable the

Steam spray gun developed by Kellogg Division of American Brake Shoe Co.

operator to use the gun continuously in comfort with bare hands. Hose supports for steam and materials reduce the downward torque on the spray head, making it more easily balanced and less tiring for the operator. Other features include a built-in finger guard, and adjustable fluid needle, and a spray head with one piece, easy-to-clean steam cap and fluid nozzle.

(*Turn to page* 67, *please*)

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FOR YOU IN *1951!*

OVER 50 YEARS OF

Specialization

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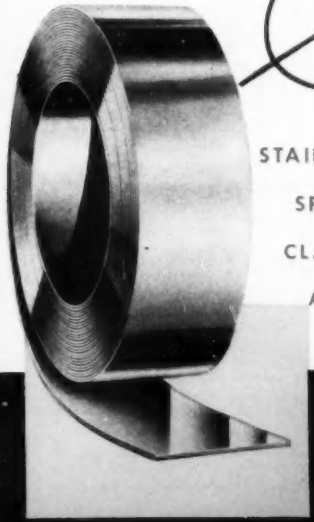

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CLAD METALS

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Specialization, in the fundamental Superior way, extends throughout our plant facilities, our research and our manufacturing techniques . . . to the sole end of producing finer strip steels for our customers. Our new plant installations, —including the Hot Mill shown above, cold rolling mills, and strip handling and storing facilities—signify faster, better service over a wider market range. • Let us detail the benefits to *you* of Superior specialization!

Superior Steel
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CARNEGIE, PENNSYLVANIA

Gasoline Survey* Shows:

95% OF NEW CAR DEALERS PICK NEW BLUE SUNOCO

AS "EQUAL TO" OR "BETTER THAN" PREMIUM PRICED GASOLINE

Make your test TOUGH—Make it FAIR —then give us your HONEST OPINION

We don't want compliments unless you feel *New* Blue Sunoco has earned them. So, won't you please fill in your honest opinion and return this card to us?

I found the performance of *NEW* BLUE SUNOCO to be:

- ☐ Much better than
- ☐ A little better than
- ☐ Equal to
- ☐ Not as good as

} PREMIUM PRICED GASOLINE

Test made in a ..... car, ... (Year)

You don't place yourself under any obligation whatsoever by mailing this card. We purposely have not even asked you to sign it. PLEASE BE SURE TO FILL IN AND RETURN IT, because we are most anxious to obtain the reaction of car dealers to our new product.

*THIS IS THE FORM which 1903 new car dealers returned after they had tried New Blue Sunoco:

Here's how they rated NEW BLUE SUNOCO

24% *"Much better"*

20% *"A little better"*

51% *"Equal to"*

5% *"Not as good"*

New Blue Sunoco saves you and your customers up to 2¢ per gallon over premium priced gasoline.

NEW BLUE SUNOCO

THE HIGH TEST GASOLINE THAT SELLS AT REGULAR GAS PRICE!

NEW CAR DEALERS

New Car Dealers know that New Blue Sunoco not only gives car owners high anti-knock engine performance but saves them money over premium priced gasoline.

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 60

(*Continued from page 64*)

C-14—Self-Compensating Strain Gage

A new type of SR-4® bonded resistance wire strain gage, self-compensated for temperature variation, announced by Baldwin Locomotive Works, Phila., Pa., is for use on Dural and steel in the form of single elements, double elements, and rosettes.

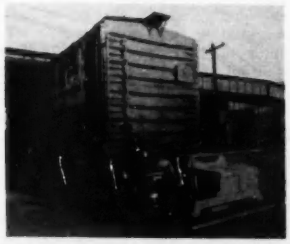
Principal advantage of the new self-compensating gage is elimination of a second strain gage to compensate for temperature changes, thus saving application time and wiring. Basically, the new gage is similar to standard bakelite gages with cupro-nickel wire and its application is by means of the same methods and phenol-resin cement.

Gages for two temperature ranges are offered: 50-300 F. and —50 to +300 F. Single-element gages for Dural or steel are in stock in four gage lengths: ¼ in., ⅜ in., 13/16 in., and ⅞ in. Temporarily, double elements and rosettes will be available on special order.

C-15—Car Spotting Trackmobile

Materials handling jobs in hauling, spotting and switching of railway cars are given a "lift" by Whiting Corp. of Harvey, Ill., with introduction of a small, compact, gasoline-powered Trackmobile.

The Trackmobile can travel either on the railway track or on the ground, and the change from one to the other takes just 30 seconds. Hydraulic jacking power is employed to develop an adhesive force which gives the Trackmobile a pulling power greater than that of plant locomotives weighing much more than the Trackmobile's 6,000 lb, the company explains.

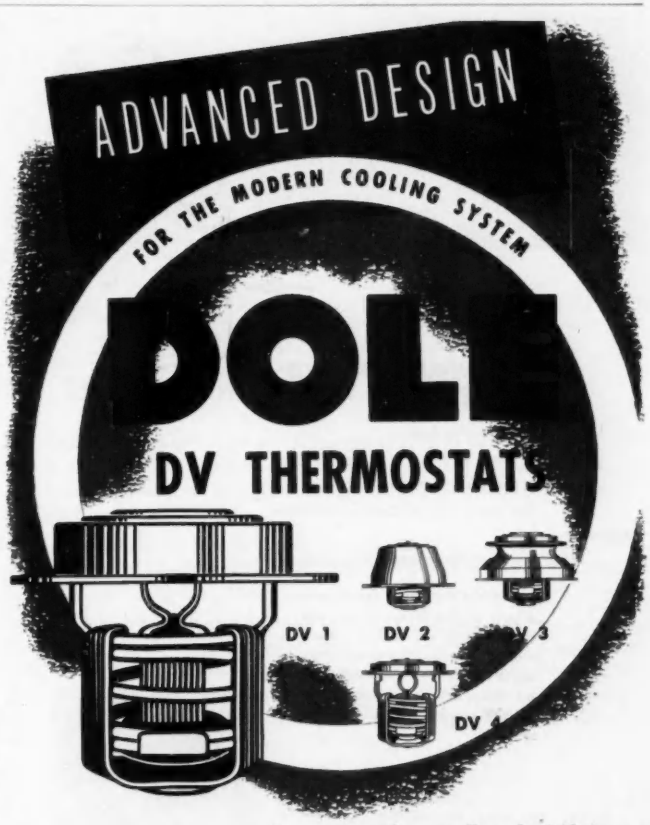


Whiting Trackmobile for handling railway cars. Driver has full vision along seat side of track.

When coupled to any standard railway car, the hydraulic jack in the Trackmobile raises the special Whiting coupler, forcing the Trackmobile down on the track. A portion of the car's weight is thus transferred onto the Trackmobile, enabling it to develop a maximum draw-bar pull of 7,350 lb.

The Trackmobile uses four standard AAR steel wheels for track travel. The four rubber-tired wheels for ground travel are hydraulically retracted when the Trackmobile is positioned for track operation. Maximum ground speed is 25 mph. Track speed varies with the load.

(*Turn to page 68, please*)



- Powerful element operates positively against high pump pressure.
- Full seating pressure aids quick warm-up.
- Accurate positive-action thermal element.

At any car speed — *regardless of outside temperature* — the DOLE DV Thermostat's valve opens to the right degree *against pump pressure.* Designed to aid smooth performance in a sealed cooling system with pressure cap, the DOLE DV is equally efficient with an atmospheric cooling system. It contributes to efficient engine operation under all conditions.

CONTROL WITH DOLE

THE DOLE VALVE COMPANY

1901-1941 Carroll Avenue, Chicago 12, Illinois

Philadelphia • Detroit • Los Angeles

Approved by Automotive Manufacturers Equipment Association

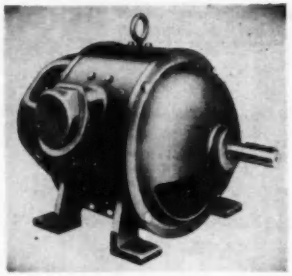
NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page 67*)

C-16—Redesigned A-C Motor

Design features proved in the ac Life-Line motor have been applied to the type SK dc motor, manufactured by Westinghouse Electric Corp., Buffalo, N. Y. Features are accessibility and protection. The rear bracket is solid on top, and covers can be added to the front bracket and lower opening of the rear bracket to provide any degree of protection. Covers use stainless steel springs for snapping into place, similar to those of automobile hub caps. A screwdriver inserted under the lip snaps it off easily, with no screws to lose or threads to damage. Soft rubber gaskets cemented to the cover provide a tight fit between cover and frame.



Westinghouse Life-Line DC Motor, Type SK

Prelubricated ballbearings are used, packed to last the life of the bearing.

An improvement consists of a molded Melamine rocker ring used to hold and insulate the rods supporting the brushholders. Melamine, a new insulating material with high dielectric strength, does not carbonize when current flows across its surface. Should a ground occur due to dirt or carbon, the maintenance man can wipe the dirt off and the rocker ring's insulation is restored.

The field coils are made of Formvar wire, having a tough multiple coat of synthetic enamel.

A new design brushholder employs stainless steel springs bearing directly on the brush, eliminating as much as possible friction joints that can stick and cause loss of tension on the brush.

C-17—Inter-Leaf Spring Lubricant

A newly-developed lubricant, Molybdenum Disulphide ($Mo S_2$), dubbed "Moly Disul," and announced by the Tuthill Spring Co., Chicago, Ill., is designed to reduce inter-leaf friction and squeaking. The company reports it will "stay-put" without change in hot or cold weather, and will not rub off at points of high-pressure contact, nor wash out with water or brine.

"Moly Disul," under test, is said to have formed a film material that is very tenacious, chemically and thermally stable, with a laminar structure similar to graphite but far more satisfactory as a solid film lubricant at high sliding velocities.

In powder form, mixed with an extremely high tensile strength oil to a semi-liquid state, "Moly Disul" can be brushed on spring leaves. The new Tuthill lubricant has amazing capacity

A COMMUTER NAMED ALI BEN ZUG,

Found out he could
travel by rug.
In that airily slow moving league
There was little of stress and fatigue

(AHEM!)

What a wonderful place for a plug.

In today's flying machines where higher horse power demands lightness and compactness of design, the metallurgical integrity and skilled craftsmanship of the Indiana Gear Works render an invaluable service.

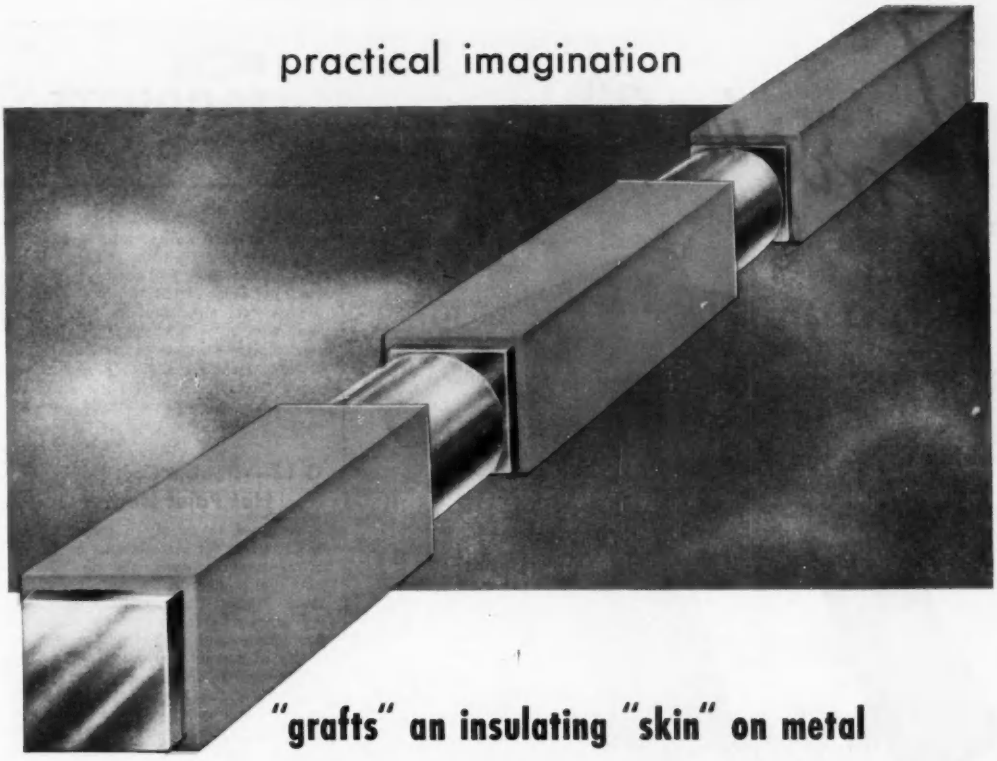
ATTENTION MR. ZUG:
This 9" overrunning clutch and internal gear is held to within .002" for concentricity and size after nitriding.

Indiana GEARS

GEARS • CAMS • INTRICATE AND PRECISE MACHINE PARTS

INDIANA GEAR WORKS • INDIANAPOLIS 7, IND.

practical imagination

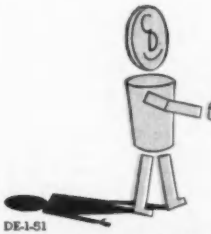


"grafts" an insulating "skin" on metal

Here is another example of the practical imagination C-D engineers can put to work to solve your problems. In this case a heavy electrical connector had to be covered with a safe, efficient insulation. The material best suited to do the job was C-D Dilecto.

The next requirement was to make this insulation an integral part of the whole piece. Here is where practical imagination went to work. The solution was to laminate and mold the Dilecto directly on the metal bar.

When you have a problem involving plastics—whether it is simple or complex—be sure to check with C-D engineers for a practical, unbiased recommendation. They can choose the material best suited to your needs from a wide range of grades of five basic plastics to give you any combination of mechanical, electrical or chemical characteristics. A call to your nearest C-D office will bring you this kind of help any time—all the time.



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CELORON (Molded High-Strength Plastic)
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VULCOID (Resin Impregnated Fibre)
MICABOND (Bonded Mica Splittings)

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forgings
by
KROPP

Connecting rod bearing cap forging for a diesel locomotive. Weight 15 lbs., 10¾" long, 6" wide, 1⅛" thick.

Diesel powered streamliners, in both freight and passenger service, are symbols of progressive railroading. Improved service is offered traveler and shipper with higher speeds, greater loads and dependable schedules. To supply such service and still operate at a profit, railroad equipment must be sturdy and tough . . . free from frequent break-downs and high maintenance costs.

In diesel powered locomotives only the best materials are used . . . which in the case of steel under stress means "forgings." *Only forgings* offer the equipment builder the long-service, trouble-free qualities for day-after-day, high speed operation.

Kropp Forge, *America's Number One Forge Plant*, supplies parts used on many crack trains and famous streamliners. Leading locomotive and car builders know that Kropp quality forgings can be installed and forgotten.

Write, wire or phone your inquiries . . . on modern forged parts for modern equipment.

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Are you receiving "FORGINGS" . . . . the KROPP publication for industry? If you want to keep current on forging facts, send us your name and address and ask for "FORGINGS".

NEW PRODUCTS

For additional information please use coupon on page 60

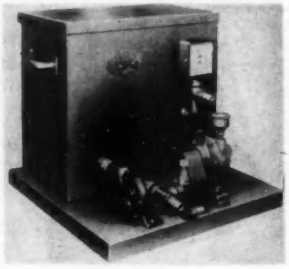
to prevent galling or squeaking, and a single application is claimed effective for a period of years.

In extremes of hot and cold weather, the co-efficient of "Moly Disul" remains almost constant. Due to the marked reduction in "break-away" friction and uniformity of inter-leaf friction, springs treated with the Tuthill lubricant improve the riding qualities of cars. With it, spring covers are declared unnecessary.

C-18—Double Unit Hot Paint Heater

Designed to supply a large volume of hot paint for installations using two or more spray guns, the new double unit paint heater, manufactured by Bede Products, Inc., Cleveland, Ohio, will supply 24 to 28 gallons per hr of hot paint—said to be double the capacity of present heaters.

The double unit heater consists essentially of two heating units mounted on a common base with a standard Bede circulating arrangement. The double



Bede double unit hot paint heater.

unit heater heats paint to 160-200 F to reduce paint and solvent waste.

Constant circulation of the paint is provided to minimize temperature drop in paint lines to the spray guns. Paint can be drawn directly from the original paint container without use of a pressure tank. The unit is completely explosion proof.

Used for spraying almost every type of finish (paints, synthetics, lacquers, etc.), the double unit paint heater provides coils for heating both paint and air. Paint coils are made of a special alloy steel which will not tarnish lacquers or delicate colors. The fluid pump used is specially designed for hot paint, and operates at slow speeds for longer life.

(*Turn to page 74, please*)

AUTO-LITE MEANS PRECISION MANUFACTURING

EVERY CAR OWNER KNOWS

"You're always right with AUTO-LITE"

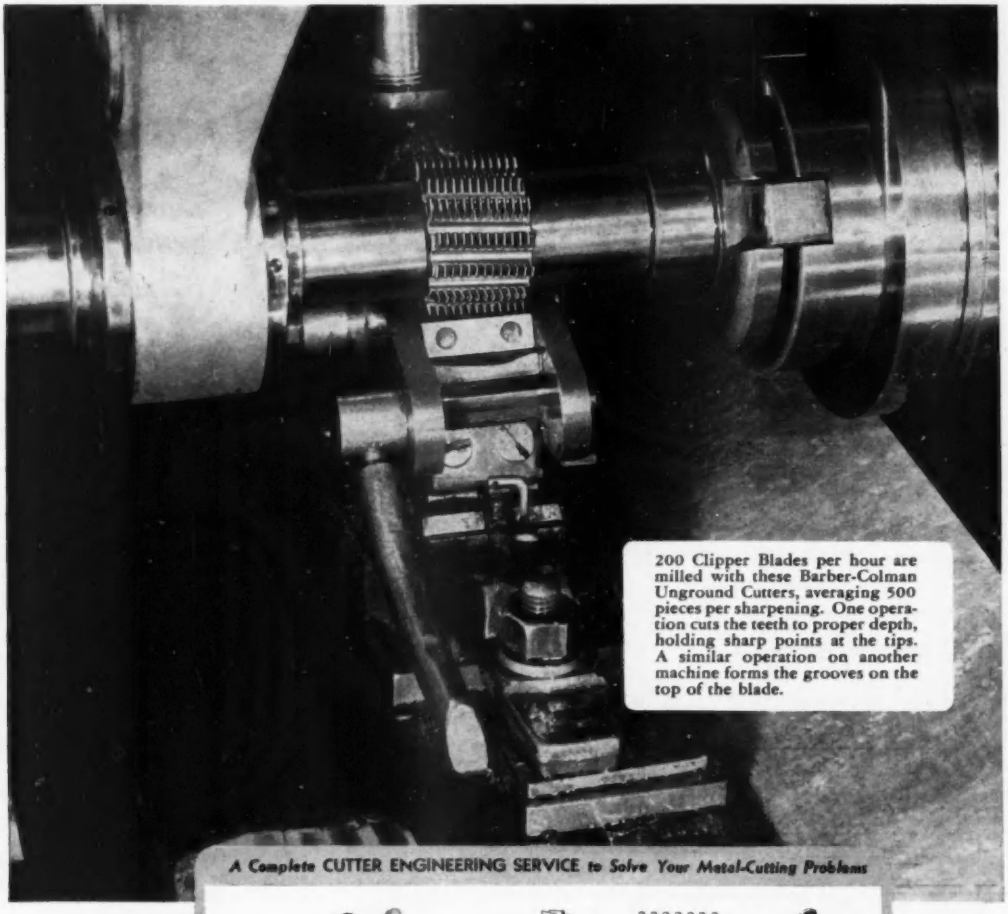
TODAY more than 400 Auto-Lite products are standard equipment on many of America's finest cars, trucks and tractors . . . convincing proof of unfailing dependability. That quality is reflected in the public acceptance of the name Auto-Lite—the best advertised name in the automotive after-market. It is reflected, too, in the establishment of Auto-Lite service facilities throughout the world. Today's buyers of cars, trucks and tractors know "You're Always Right...With Auto-Lite."

THE ELECTRIC AUTO-LITE COMPANY
Toledo 1 Ohio

BARBER-COLMAN

FORMED CUTTERS

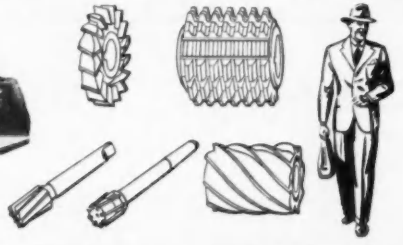
Mill Deep, Fine Tooth Forms



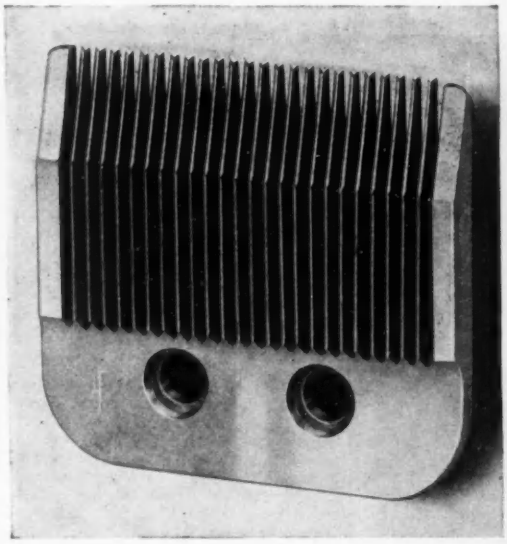
200 Clipper Blades per hour are milled with these Barber-Colman Unground Cutters, averaging 500 pieces per sharpening. One operation cuts the teeth to proper depth, holding sharp points at the tips. A similar operation on another machine forms the grooves on the top of the blade.

A Complete CUTTER ENGINEERING SERVICE *to Solve Your Metal-Cutting Problems*

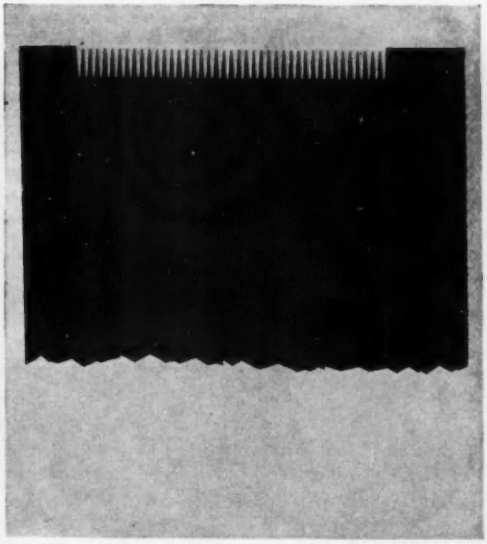
BARBER COLMAN



JOB-ENGINEERED DESIGN • FULL LINE OF STANDARD TOOLS • FIELD SERVICE



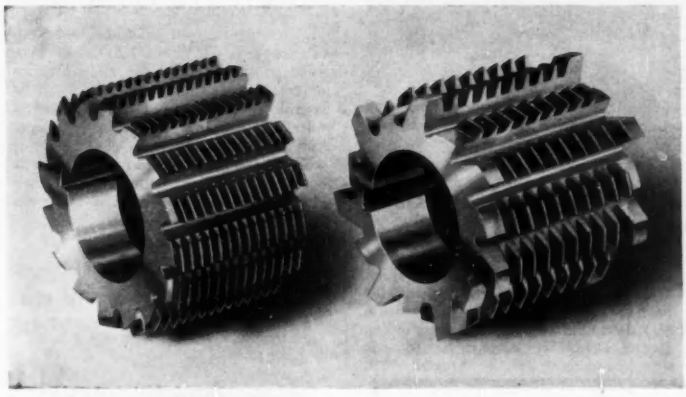
▲ Clipper blade showing depth of form, with teeth ranging from .012″ to .018″ thick depending on blade style. One operation cuts the teeth and a second forms the grooves on top of the blade. Other Barber-Colman cutters are also used to mill the angle, sides and back of the blade.



▲ Enlarged section of teeth indicates the cutter problems in milling long thin teeth with sharp tips. Cutters are designed with intermittent rows of teeth to give extra tooth strength and to assure uniformly sharp points. This design assures consistent accuracy and long life.

Cut Thin Sections...Hold Sharp Points With Maximum Accuracy and Production

▼ Pitch of cutter teeth is held within .0005″. Cutters are unground with straight or helical gashes. The pitch of one cutter must match the pitch of the other to assure absolute alignment of grooves with teeth on the blade. Barber-Colman design assures duplication of accuracy whether cutters are ordered in sets or individually at intervals.



FOR

Those Tough Milling Problems

YOU SUPPLY THE FORM!...

WE'LL DESIGN THE CUTTERS

TO

COMBINE CUTS
PROLONG TOOL LIFE
SPEED OPERATIONS
DUPLICATE ACCURACY
MAKE THE JOB EASIER

SEND BLUEPRINTS FOR QUOTATION TO DEPARTMENT AI.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 461 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

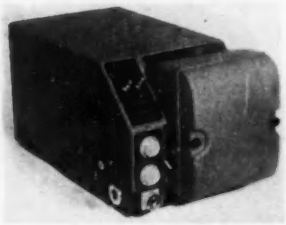
NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 70)

C-19—Recording Oscillograph

Latest addition to the line of precision dynamic measurement and recording instruments put out by Consolidated Engineering Corp., Pasadena, Calif., is the new Type 5-116 recording oscillograph aimed at low-cost, high-volume production. Although similar to other oscillographs manufactured by Consolidated, it is smaller and lighter by almost 50 per cent. For utilizing its wide range of record speeds from ¼ to 100 in. per second, a quick-change, ten-speed transmission is optionally available instead of change gears.



Consolidated Engineering recording oscillograph, Type 5-116.

Source of power for the record transport system is a governor-controlled motor directly connected through gearing to the record drive roll in the magazine. Thus all belts, friction drives, etc., are eliminated and the full power from the motor may be utilized in obtaining maximum record acceleration without slippoge. Additionally accurate speed control is assured during the recording period.

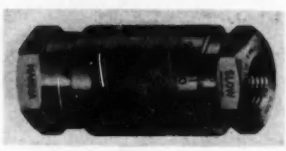
Record tension is maintained constanti throughout the entire 125-foot length of record by an ingeniously designed "controlled torque" clutch, assuring smooth operation.

A "combed light" double-collimating optical system, which provides for the projection of high-intensity light in controlled beams onto the galvanometers, eliminates all objectionable stray light, for producing records having high definition.

A new prefocused galvanometer lamp (designed to CEC specifications) provides source of light for the galvanometers. Using this source, the 5-116 is capable of writing speeds of approximately 25,000 in. per second on Eastman Linagraph 1127.

The 5-116 oscillograph is available in 9- or 14-trace block capacity for either 24-28 volt d-c or 115-volt, 60-cycle a-c drive.

C-20—Speed Control Valves



Hanna "Flo-Set" speed control valve.

Announced by Hanna Engineering Works, Chicago, Ill., a new line of "Flo-Set" speed control valves in three sizes —¼, ⅜, and ½ in.—features microme-

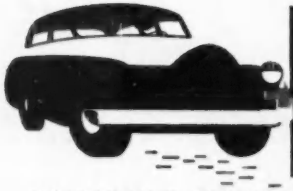
For all practical purposes that's exactly what you do with TUNG-SOL Signal Flashers.

During twelve years to date almost 10,000,000 TUNG-SOL Flashers have been used in automotive signal systems. So few have been the service replacements, that the vast majority of these Flashers were literally "installed and forgotten."

There is nothing surprising in this, considering the unequalled mechanical vitality of TUNG-SOL Flashers. The basic simplicity of their design—*only one moving part*—practically guarantees trouble-free service. They operate efficiently under the voltage variations encountered in automotive service and they have ample ruggedness to withstand vibration and shock.

And remember—*the Tung-Sol Signal Flasher is the only device of its kind which permits use of the important instrument panel indicator light.*

There are numerous types of TUNG-SOL Signal Flashers, each designed for a specific circuit requirement. All of them are small and may easily be located in confined space. Write for the TUNG-SOL Signal Flasher Bulletin. TUNG-SOL LAMP WORKS INC., Newark 4, N. J. Sales Offices: Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, Newark.

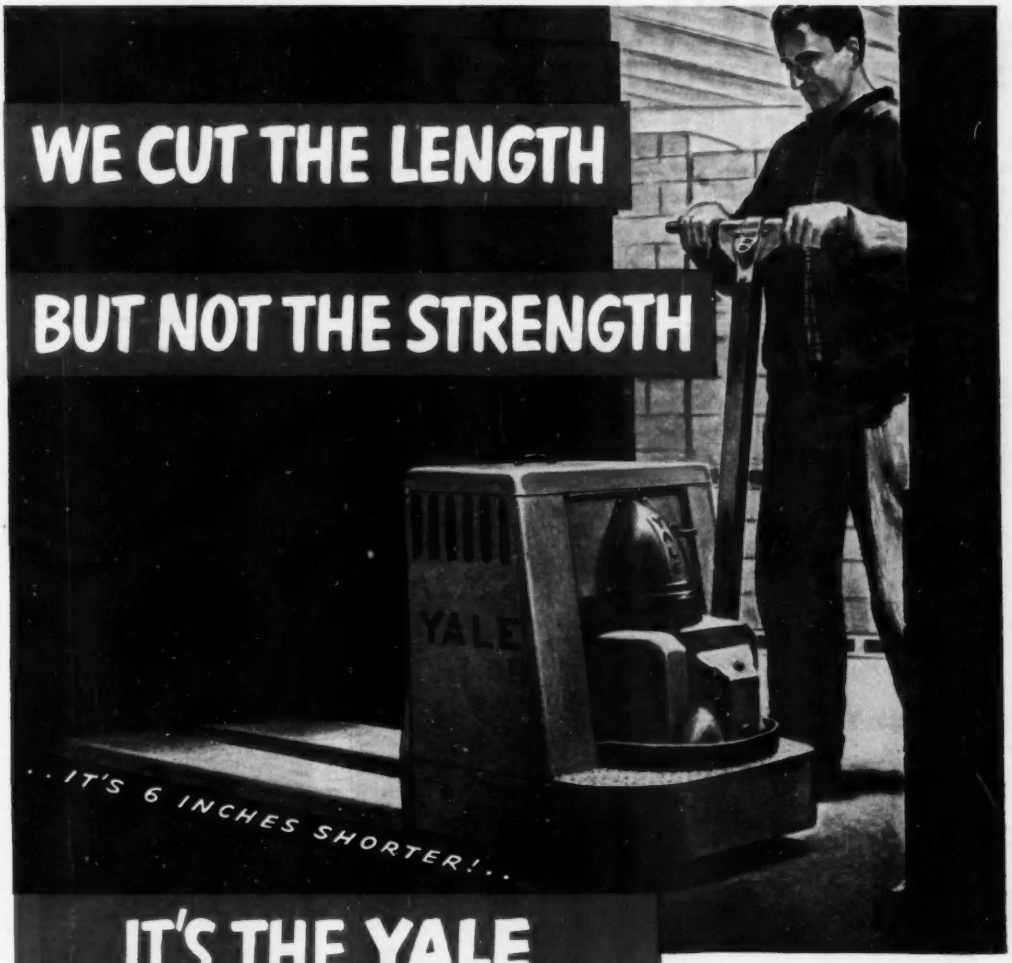


TUNG-SOL
SIGNAL FLASHERS

ALSO AUTO LAMPS, ALL-GLASS SEALED BEAM LAMPS AND ELECTRON TUBES

WE CUT THE LENGTH

BUT NOT THE STRENGTH



IT'S THE YALE *WORKSAVER* "STUBBY"

RIDE IT OR WALK IT

Lifts and carries maximum loads in narrow aisles, boxcars, highway trucks!

Small enough to go where bigger trucks can't—so maneuverable it can turn in its own length—yet strong enough to carry loads of 2,000 to 6,000 lbs! That's YALE'S WORKSAVER—"STUBBY."

It speeds up your materials handling on hard-to-get-at jobs, gives you more storage room because it needs less aisle space.

A powerful electric drive unit and a rugged welded steel frame keep this truck on the job for years with a minimum of "down time." It's remarkably safe and easy to operate, too. Controls for hoisting, positive action safety brakes, and two-speed drive in either direction are all built into the steering handle.

Our representative will be glad to show you how all of these advantages add up to real savings of production time and money for you. *Just send us the coupon today.*

TRADE YALE MARK

MAIL THIS COUPON NOW

The Yale and Towne Manufacturing Co.
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Roosevelt Boulevard & Haldeman Avenue
Philadelphia 15, Pa.

I am interested in cutting my materials handling costs.

____Please have your local representative call on me.

____Please send me FREE detailed literature.

Name_____

Company_____

Street_____

City_____ State_____

THE YALE & TOWNE MANUFACTURING COMPANY, PHILADELPHIA 15, PA.

NEW PRODUCTS

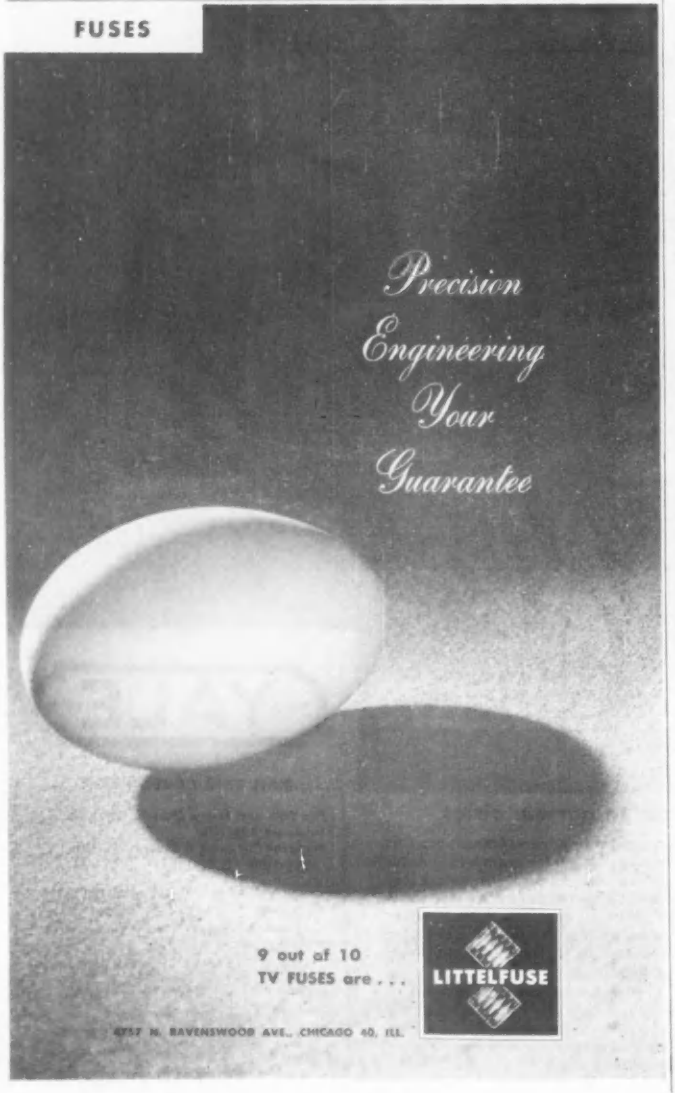
For additional information please use coupon on page 60

ter graduations for precision speed control of low pressure cylinders. A fourth speed control valve, the ¼ in. Jr., specifically designed for use with tubing, functions the same as the larger size Flo-Set valves but does not include the micrometer adjustments.

The new valves, suitable for air, water or oil control, with maximum pressure to 250 psi, and maximum temperature to 250 F, may be mounted in any position.

The face of one end is marked "controlled flow out—free flow in" and the other end face is marked "controlled flow in—free flow out." Controlled flow means that the orifice controlling the flow can be adjusted from zero to full size opening—with one revolution of the adjustment sleeve. Graduations are in hundredths of a revolution, with each hundredth representing 1/100 of the pipe area. Free flow means unrestricted flow through an orifice equal to the pipe area.

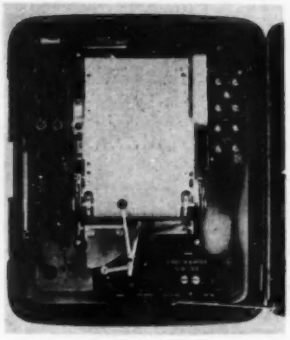
Valves are designed so inside construction is not damaged if excessive torque is applied during installation. All metal parts are made of aluminum except for stainless steel springs. Seals and poppets are of molded synthetic.



C-21—Strip-Chart Strain Recorder

Brought out by the Baldwin Locomotive Works, Phila., Pa., is a strip chart strain recorder for continuous measurement of surface strain in structures or machines by means of SR-4 resistance wire strain gages. The recorder is an electronic type instrument designed and calibrated for use with two SR-4 gages having a resistance of 120 ± 1.2 ohms and a sensitivity factor between 1.9 and 2.2.

Usually one gage is active and the other is used for temperature compensation but both may be active for measuring combined bending and tensile stresses or differential strains.



Baldwin SR-4 strip-chart strain recorder.

Available ranges in the instrument are 0-2000, 0-5000, and 0-10,000 microinches per in. It provides ten chart speeds within a range of ¾ in. to 720 in. per hr or 12 in. per min. The pen moves across a 4½-in. wide chart in a straight line, thus making coordinated readings of time vs. strain simple. Instruments are available with full scale traverse speeds of one, three or five seconds without overshoot.

The pen may be zeroed at any point on the chart and the instrument range can be changed at any time during a measuring run if zero adjustment set-

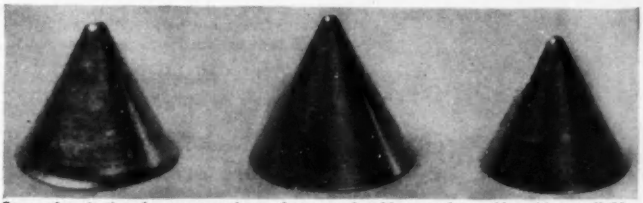
(*Turn to page 82, please*)

(*Advertisement*)

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

"Bridgeport" MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND.—IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTREAL



Stages of production of copper cone shows: the cup produced in an eyelet machine with no wall thinning; the cup after stamping, in which the wall is tapered from 0.024 in. to 0.032 in.; finished cone after trimming in shimmy die—Courtesy John Ahlbin & Sons, Inc., Bridgeport, Conn.

Copper Cone Accurately Stamped with Punch and Die Inserts

The use of inserts in header dies has increased die life by reducing the tendency of dies to crack.

Using this same principle, it was possible to stamp the illustrated copper cone without cracking of either the punch or die.

The finished part has a large diameter of 1-1/4 inches and is 1-3/16 inches high. It is essential that the wall taper from 0.024 in. at the tip of the cone to 0.032 in. at the mouth.

The cup for the stamping operation is made in a multiple-plunger press by the folding method, from 0.032 in. copper strip. The blank is then annealed.

Solid Dies Fail

When the cone was first engineered, solid dies were made. Due to the pressure necessary to taper the wall 0.008 in., cracking of both punch and die occurred. If the punch was drawn back to a softer temper, it then would be pounded into the shape of the die, removing the difference in angle to obtain the tapered wall thickness. Finally inserts were made of 5% chromium hot-work steel. These were hardened and drawn to a 60-61 Rockwell C hardness and chrome plated, then shrunk into holders.

The holders were made from tool steel but not hardened, making strong, tough backup material for the dies. The hardness of the punch and die, plus the chrome plating, cut wear to a minimum. The chrome plate also reduced the tendency to gall.

A bottom-stroke press was selected. Impact was therefore minimized. The press was aligned and it was found that an open die set produced accurate shells with a variation of not more than 0.001 around the cup.

Accurate Cups Necessary

Accurate cups from the eyelet operation with a minimum of variation were found necessary to control concentricity.

Trimming of the finished cone presented another problem. The edge had to be parallel to the horizontal axis of the cone. Distortion also had to be eliminated. A shimmy die, operated by four cams, was chosen.

The bottom die was made to nest the cone accurately. The tip of the punch fitted snugly and was spring-loaded with a universal action and the cutting action was from the inside of the cone outward. The trimmed edge was clean.

Since a soft cone was required, it was given a full anneal after the trimming operation.

Stress Relief Anneal Needed to Protect Coldworked Parts

Coldworking, such as stamping, roll threading and drawing, especially of the high brasses, sets up stresses in the part which under humid conditions can produce season cracking.

When copper-base alloys are highly stressed, season cracking is not inevitable since four other requisites are involved: ammonia, moisture, oxygen, and type of alloy.

The history of the illustrated oil reservoir cap shows to some extent the phenomenon of season cracking.

The shell which cracked not only was drawn into a cup but a very coarse broad thread was rolled on.

For several years this cap gave good service. The tank and cap were always left on the heater, in the kitchen.

However, one summer the tank was left in the cellar. When an attempt to remove the cap was made in the fall, a strap wrench was necessary.

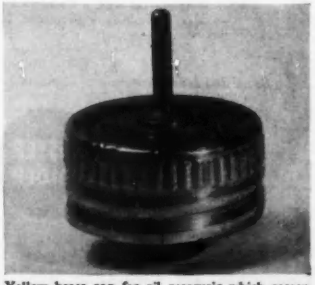
Examination showed a crack running from the lip to almost the base which caused the shell to go out of round and bind. Another cap was purchased and the following summer the tank was again left in the cellar. The same thing happened under the humid, musty conditions in the cellar. However, the cap on a second tank did not crack when it was kept in the kitchen.

Removal of Stresses Needed

Stress relief annealing at a temperature below the recrystallization point of the high brass would have relieved the residual stresses set up by coldworking and preventing cracking.

The use of copper or high copper alloys above 85% copper such as red brass, gilding metal and the silicon bronzes will help to reduce the danger of season cracking, but very highly stressed metals, no matter what the alloy is, should be stress relief annealed to insure against such failure.

(6156)



Yellow brass cap for oil reservoir which season cracked due to stresses set up in roll threading operation.

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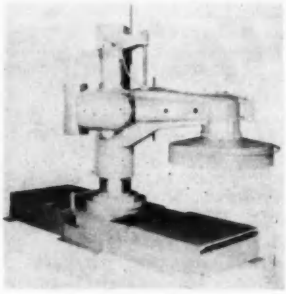
(*Continued from page* 58)

of any ferrous or non-ferrous materials that can be machined with standard carbon steel saw bands. In addition it friction saws tough ferrous alloys such as stainless steels up to ½ in. thick.

B-10—Dual-Type Core Grinders

The Milwaukee Foundry Equipment Div. of SPO, Inc., Cleveland, Ohio, is producing a new Series No. 71 dual-type core grinder for fast vibrationless performance on a wide variety of core grinding operations. Column, grinding wheel and drive shaft are mounted on large, dustproof, precision ball bearings to assure smooth vibrationless grinding, whether machine is used on continuous or intermittent basis.



SPO dual-type core grinder, series No. 71.

Series No. 71 dual-type units make possible the grinding of large cores at one grinding station while the second station is being unloaded and reloaded. Employing a 42-in. grinding wheel with a 38-in. effective cutting diam, grinders can handle a wide range of intricate or cumbersome cores. Adjustable wheel arm, which is balanced to provide smooth performance, swings progressively around a complete 360-deg arc to accommodate existing core handling systems at either one of the two grinding stations. Wheel height above the table ranges from 15 in. minimum to 12 in. maximum. Powered by a 5-hp 900-revolution per minute motor, the grinding wheel operates at 242 revolutions per minute. Grinder measures 91-½ in. high and has a 74-in. swing clearance radius.

NEW SUN PRODUCT CLEANS HYDRAULIC SYSTEMS Without Downtime!

SUN'S NEW HYDRAULIC SYSTEM CLEANER eliminates the production loss and man-hour loss that usually go with the cleaning of equipment. This product does its work *without interrupting production*. It has the detergency to remove the sludges and gums formed by oxidation of hydraulic oil, soaps formed from coolants and cutting oils, and other contaminants. Besides permitting operations to go on undisturbed, it protects the system against further rusting once parts have been cleaned. Sun Hydraulic System Cleaner has been thoroughly "Job Proved" in cleaning up hydraulic systems of presses, machine tools, and circulating systems of a great variety of industrial equipment. It is available in viscosities suitable for any pump. Get peak performance out of *your* equipment by using Sun Hydraulic System Cleaner.

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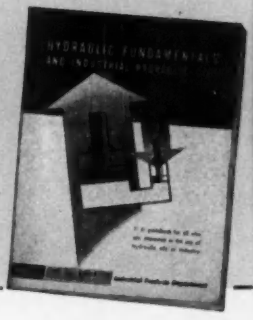
to anyone who uses or maintains hydraulic equipment: this booklet by Sun Engineers on the fundamentals of hydraulic systems and the application of hydraulic oils. It will prove valuable as a guidebook in day-to-day work, a refresher course for engineers, or a readable instruction book for nonprofessionals.



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NEW PRODUCTS

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(*Continued from page* 76)

tings for all three ranges have been initially determined.

The new instrument is the counterpart of the Baldwin SR-4 disc chart strain recorder and is provided with controls and simple adjustments for gage factor, range, and coarse and fine zero settings grouped across the top of the instrument inside the door. Precision measurement of gage resistance variations is made by a 1000 cps bridge circuit. Electronic parts of the instrument are mounted on the back of the case, protected by a gasketed cover. Accuracy of measurements in all usual applications is not affected by amplifier tube characteristics or changes, or by normal power variations.

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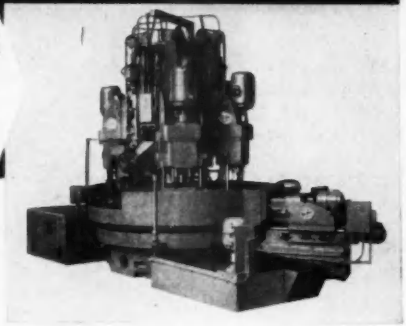

Here's a good example of the application of standard machine units to a special production job. Drilling and reaming operations of suspension support holes are performed on both right-hand and left-hand parts simultaneously. Drilling and reaming king pin holes is also included. Six stations, five operating and one loading, handle all operations with a total of 16 spindles. Machines of this type can be furnished from standard basic units for special applications on most all metalworking operations.

For Combined Operations or Single Purpose Machines

Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. An indexing table with ROTO-MATIC POWER HEADS is easily arranged to suit special machining operations.

Lower Maintenance Costs with ROTO-MATIC Mechanical Power Heads

This machine is a good representative of the applications of D. & T. Roto-matic mechanical power heads. Six heads are used, three vertical and three horizontal. These new power heads lower maintenance costs through elimination of excessive servicing.

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C-22—Vitrified Bond Grinding Wheels

A 5 per cent to 10 per cent boost in grinding and finishing output is said to be promised grinding wheel and mounted wheel users, due to a new vitrified bond developed by Chicago Wheel & Mfg. Co., Chicago, Ill. Called "79E," this new bond is recommended by the manufacturer for portable grinding of billets, brake drums, forgings and forging dies, annealed malleable castings, steel castings, centers and stainless steel welds, etc.

The "79E" bond is said to assure a smoother, faster cutting action for vitrified grinding wheels operated at speeds up to 6,000 sfpm. Longer production time per wheel is also provided, with lowered downtime for changeover or wheel dressing afforded. And, being considerably tougher, these wheels are declared to resist wheel breakdown longer.

(*Turn to page* 85, *please*)

New *AIRCRAFT* PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 52)

per cent with a frequency stability factor of plus or minus 0.01 per cent. It has an eight channel frequency range between 121.5 and 122.9 mc.

The receiver has a sensitivity of one microvolt and selectivity of 90 kc nose width with 60 db attenuation on adjacent 200 kc channel. It is temperature compensated for tuning stability.

The Narco omni has a course width (meter scale length) of approximately 30 deg. The marker beacon receiver has a sensitivity equal to or exceeding Army specifications. Units now available are for 12 volt airplanes and are applicable for installation in most popular airplanes. The panel itself is molded of acrylic plastic and is edge lighted so that all controls are visible for night flying.

Total installed weight of the equipment including antenna and cables is 18½ lbs. Dimensions of the power modulator supply are 5⅝ in. by 5⅞ in. by 7⅝ in. It weighs 6¾ lbs.

(*Turn to page* 88, *please*)

Put a great competitive spirit into your product... *by working with*

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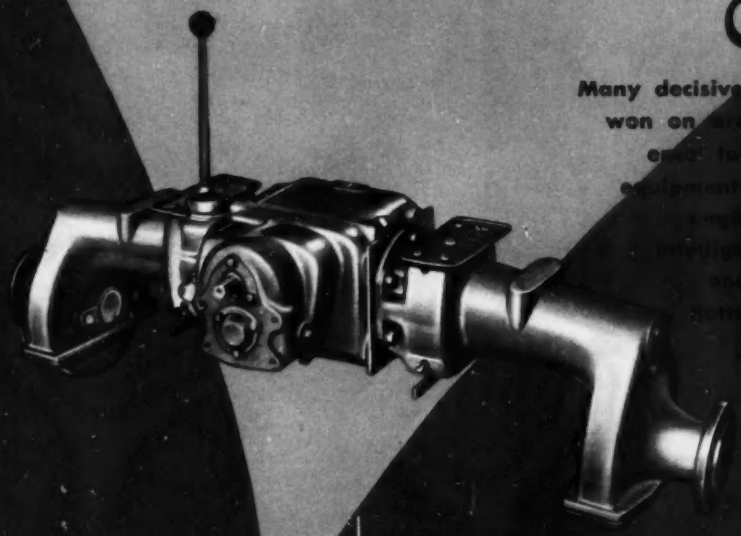
Many decisive sales victories are being won on drawing boards and perfect assembly lines—where engineers, equipment manufacturers and users work together. Their intelligent collaboration produces new and well-nigh perfect results: better machines—supplying the unbeatable competitive spirit that's characteristic of all Clark Products.



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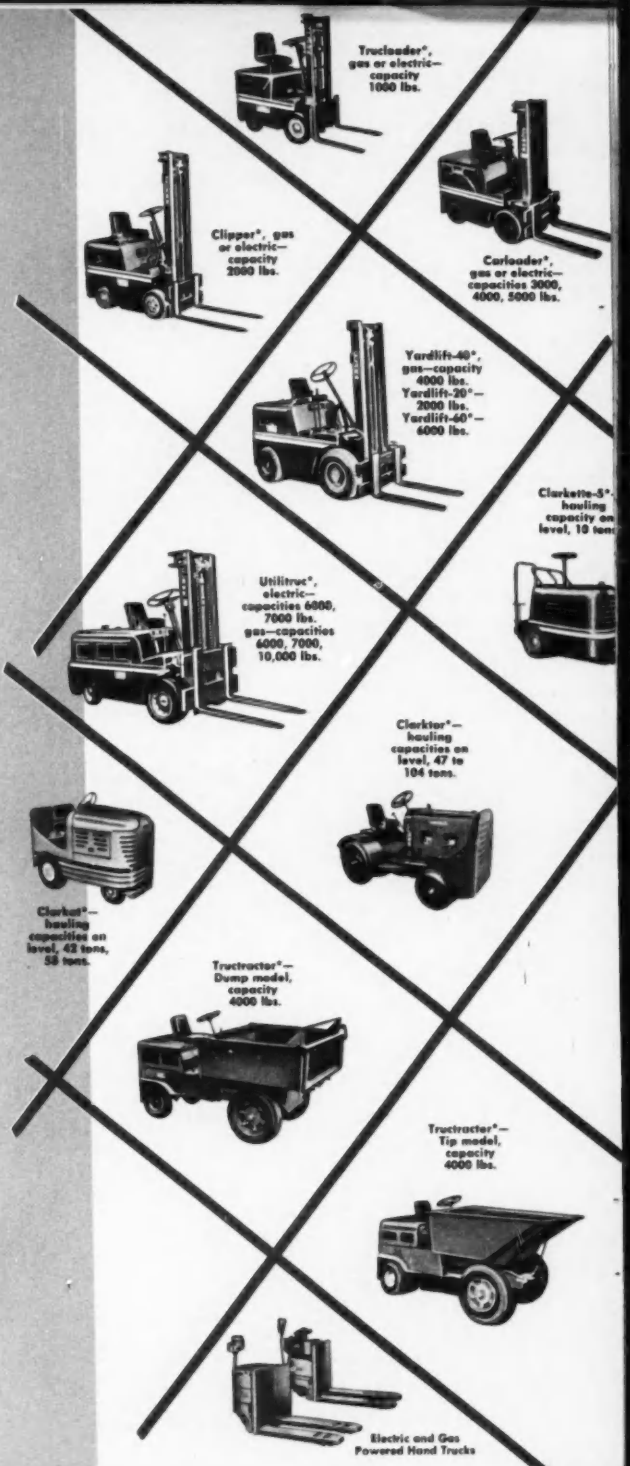
Now is the best possible time to find out how you, too, will Purchase for Profit when you Purchase from Clark.


Trucloader*, gas or electric—capacity 1000 lbs.
Clipper*, gas or electric—capacity 2000 lbs.
Carloader*, gas or electric—capacities 3000, 4000, 5000 lbs.
Yardlift-40*, gas—capacity 4000 lbs. Yardlift-20*—2000 lbs. Yardlift-60*—6000 lbs.
Clarkette-5*, hauling capacity on level, 10 tons
Utilitruc*, electric—capacities 6000, 7000 lbs. gas—capacities 6000, 7000, 10,000 lbs.
Clarktor*—hauling capacities on level, 47 to 104 tons.
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NEW PRODUCTS

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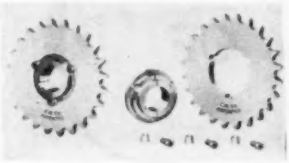
(*Continued from page* 82)

C-23—Interchangeable Hubs For Disk Sprockets



Contribution to the power transmission industry is claimed for the Cullman Grip-Master introduced by the Cullman Wheel Co., Chicago, Ill. The Grip-Master provides interchangeability of hubs for disk sprockets, reduced to extreme simplicity. Sprocket plate is placed on the hub, the taper bushings are inserted, head cap screws are tightened and assembly is complete, ready for mounting on the shaft. Frequently the plate sprockets may be interchanged and mounted without removing the hub. This Cullman Grip-Master is made of steel, bored, drilled and split, ready to receive the plate sprocket.

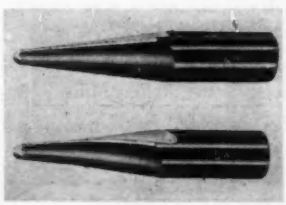
C-24—Ball Nosed Taper Die Sinking Cutters

Taper die sinking cutters with full-cutting ball nose are now being produced in two types as stock items by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. Cutters are ready to use with ball nose finish-ground to cut to dead center, so that no preliminary hand grinding is necessary.

Two styles of fluting are available: straight, for easy hand sharpening; and spiral, for users who prefer helical cutting characteristics and have mechanical grinding equipment.

The cutters have a 7-deg taper (14-deg included angle) and are regularly furnished with right-hand cut and straight shanks. The ball nose has a radius equal to one-half the diam of the small end, and blends smoothly into the taper.

All sizes in both types are regularly provided with Pratt & Whitney Diamond Blue hardening treatment.



Pratt & Whitney taper die sinking cutters with finish ground ball nose.

C-25—Experimental Plant Layout Kit

Designed to demonstrate the values obtained from 3-dimensional planning, "Visual" Planning Equipment Co., Inc., Oakmont, Pa., is introducing a 200-piece kit of machines, benches, trucks, conveyors materials-handling equipment, office and toilet equipment together with a 12 in. by 18 in. lucite planning board columns and layout tape.

The planning kit will not plan a specific plant, but will enable the user to test merit of this type of planning.

(*Turn to page* 94, *please*)

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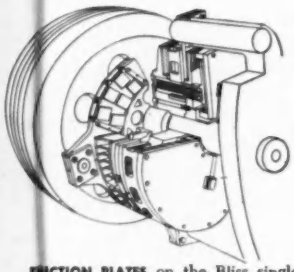
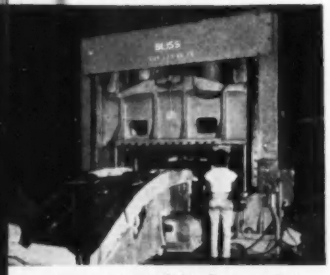
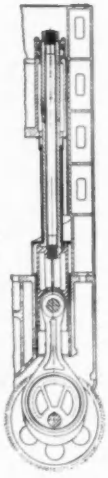


FRICTION PLATES on the Bliss single disc clutch are arranged for rapid heat dissipation. When worn, you can replace them quickly without disassembling the clutch.



23 DUPLICATES of this first installation in a leading automotive plant are now being built in Bliss plants.



UNUSUALLY LONG CONNECTIONS hold side thrust to a minimum. This drawing shows one entire side of the press.

Manufacturers using assembly-line methods to produce large stampings can save precious maintenance time with Bliss' new 4-point presses. All major assemblies—gearing, connections and clutch—are designed for faster, more convenient adjustment and part replacement.

Several hours are saved in shaft removal alone through a bearing arrangement which permits the shafts to be dropped straight down. And the clutch requires no adjustment for wear. Long-wearing friction plates can be replaced without disassembling the clutch. Extremely long slide adjustments can be made quickly through a motor-driven adjusting mechanism meshing with external threads of the sideposts. Driving gears, located beneath floor level in a pit for convenient maintenance, are protected with enclosed sideposts which prevent dirt and scrap from creeping into drive box.

Available in sixty-three standard sizes with specifications established by the Joint Industry Conference, these Bliss presses feature an eccentric drive, unusually long connections and a rigid frame construction with full box sections and wide bases.

Whether your requirements involve one-, two- or 4-point presses, overdrive or underdrive construction, Bliss' unrivaled experience in the design and manufacture of heavy-tonnage presses is your assurance of low-cost, trouble-free service. We'll be glad to send you full details.

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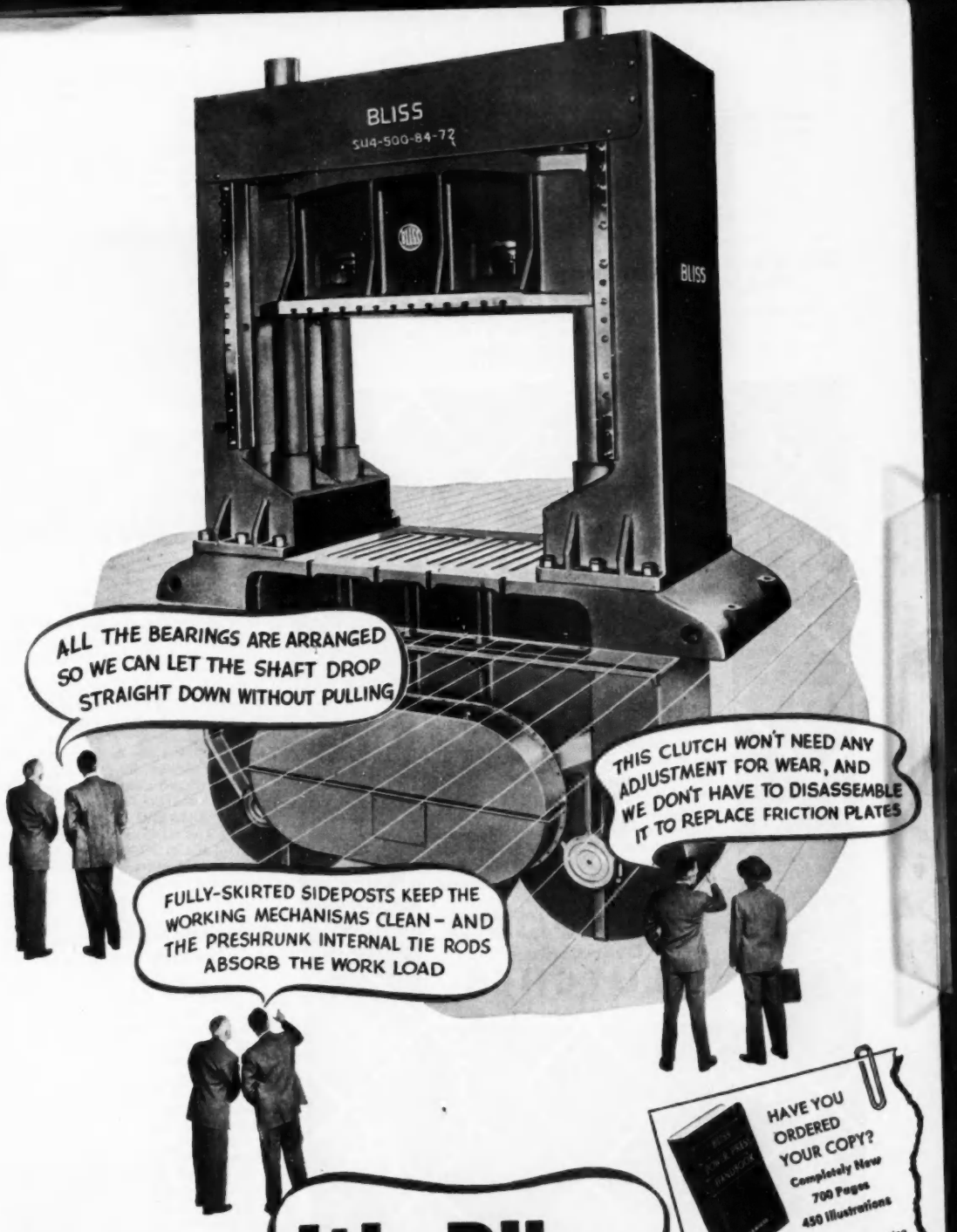
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BLISS
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THIS CLUTCH WON'T NEED ANY ADJUSTMENT FOR WEAR, AND WE DON'T HAVE TO DISASSEMBLE IT TO REPLACE FRICTION PLATES
FULLY-SKIRTED SIDEPOSTS KEEP THE WORKING MECHANISMS CLEAN – AND THE PRESHRUNK INTERNAL TIE RODS ABSORB THE WORK LOAD

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NEW PRODUCTS for AIRCRAFT

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(*Continued from page* 82)

R-8—Riveter's Tape; Masking Tape

Two specialized tapes for the aircraft industry put out by Minnesota Mining and Mfg. Co., St. Paul, Minn., are a riveter's tape, and a masking tape for "Plexiglas" installations. Both are "Scotch" brand tapes having a pressure-sensitive adhesive for sticking in place immediately upon contact.

The specialized masking tape is "Scotch" brand cellophane fiber tape No. 670 designed to mask against the spread of solvents used in cementing "Plexiglas" on aircraft. It is made in a 2592-in. length, and in widths of ½,

Minnesota Mining and Mfg. Co. riveter's tape, No. 775.

¾, 1 and 2 in. with other widths available. It has tensile strength of 40 lb per in. of width and a thickness of 5.2 mils.

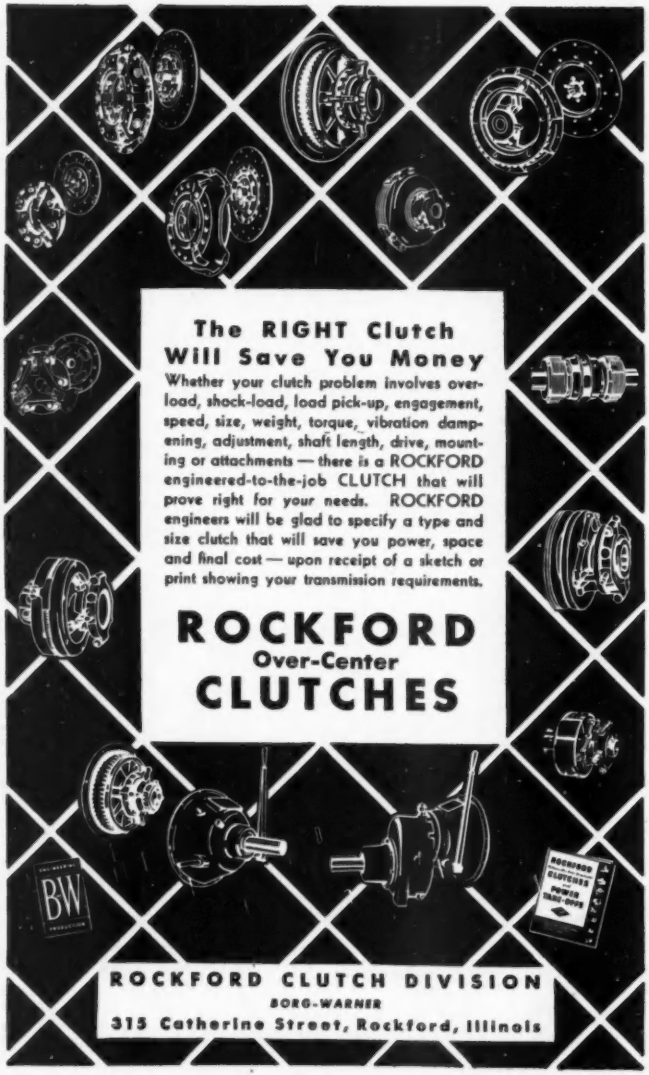
The riveter's tape, No. 775, a revival from World War II, is a transparent acetate fiber tape with a pressure-sensitive adhesive on the edges only. Said to cut riveting time in half, it holds a row of rivets in place for riveting, yet can be stripped away in one piece afterward, since there is no adhesive in the center of the tape to stick to the rivet heads. The tape is made in ¾ and 1-in. widths, and in a 1296-in. length. It has a five-mil thickness and tensile strength of 25 lb per in. of width.

R-9—Impregnating Varnish

An impregnating varnish for electrical units which in addition to being oil-resistant does not crack on exposure to —70F has been developed by the Frederick S. Bacon Laboratories of Watertown, Mass. Field proven over a period of a year on instruments used by the Air Force, the physical properties of films of ABC impregnating varnish applied to brass strips and cured one hour at 150F plus one hour at 212F, are as follows:

No change in appearance after 48 hours' immersion in chlorinated diphenyl, Acryloid Resin dissolved in dioctyl sebacate, petroleum base lubricating oil, or fluorocarbons. No change after cold crack test of 15 min at 150F, 15 min at —70F, 15 min at 150F, 15 min at —70F, etc.

The average electrical properties of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Whether your clutch problem involves overload, shock-load, load pick-up, engagement, speed, size, weight, torque, vibration dampening, adjustment, shaft length, drive, mounting or attachments — there is a ROCKFORD engineered-to-the-job CLUTCH that will prove right for your needs. ROCKFORD engineers will be glad to specify a type and size clutch that will save you power, space and final cost — upon receipt of a sketch or print showing your transmission requirements.
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Gear Tooth Crowning

(ELLIPTOID TOOTH FORM)

A CONTROLLED PRECISION MACHINING OPERATION

Gear tooth crowning (Elliptoid Tooth Form) is used for just one purpose—to prevent "end bearing," which is a concentration of operating load at the end of the tooth where it is most vulnerable to failure.

Crowning is the only way to prevent end bearing because with any gear assembly it is impossible to maintain accurate gear alignment under all conditions of loading. Shafts, bearings and mountings are all elastic. Even the slightest deflection will cause misalignment and end bearing in gears with conventional teeth.

Many of the leading automotive gear plants have standardized on crowning to raise the factor of safety of gear teeth and to reduce operating gear noise. Crowning does both successfully.

Crowning accomplished on Red Ring Gear Shaving Machines is a precision machining operation by which the maximum amount of crown is always under positive control. Tolerance control is indicated by a typical routine check of a lot of 4000 gears having the following specifications: 1″ face, 18 teeth, 13.5 Nor D.P., 20° Nor P.A., 27° H.A. and .0003″ to .0005″ crown. An adequate check failed to reveal any unit outside the .0002″ tolerance on crowning.

WRITE FOR BULLETIN S49-5 FOR A MORE DETAILED DISCUSSION OF GEAR TOOTH CROWNING

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

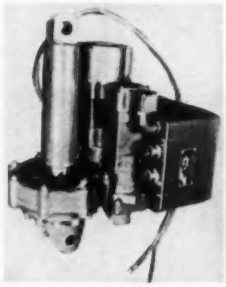
NEW PRODUCTS for AIRCRAFT

ABC impregnating varnish are given as follows: dielectric strength (1/16 in. thick), 500 volts/mil; dielectric constant at 60 cycles, 3.3; power factor at 60 cycles, 0.016; loss factor at 60 cycles, 0.05.

R-10—Automatic Pilot Control

Automatic pilot control plus manual control is provided by new dual motor power units recently perfected by Electrical Engineering and Mfg. Corp., Los Angeles, Calif. The units provide power to actuate the stabilizer on turboprop and jet aircraft of recent design.

For additional information please use coupon on page 60



Electrical Engineering Co.'s stabilizer actuator assembly incorporating dual motor power unit to give two different drive rates for manual or automatic pilot control.

One of these units is a complete actuator assembly incorporating at 1/10 hp and 3.3 hp motor operating through individual gear reductions to give a drive rate of 6/100 in. per second and 7/10 in. per second to the screw jack. Normal operating load of the assembly is 11,000 lb. Static load is 80,000 lb. The small (1/10 hp) motor operates almost continuously under control of the automatic pilot. The 3.3 hp motor provides for pilot control at a higher rate for maneuvering. This complete actuator operates on 28 volts and has overload and limit switches, radio noise filter, position indicator and non-jamming stops.

A similar dual motor power unit incorporates a 1/15 hp continuous duty motor for automatic control and a 3½ hp motor for manual control.

R-11—Rapid Drying Safety Solvent

Latest solvent in the line of "Stratocleaners" for aviation maintenance offered by Fine Organics, Inc., New York, N. Y., is Stratosene, a rapid drying solvent, having a flash point of 140 F (Pensky-Martin closed up) for use in cleaning of mechanical and electrical parts. Low toxicity, high flash point, and zero residue on drying make Stratosene a companion product to stratolene (formerly known as Stratosol) which is slow drying, though its flash point is considerably higher (190 F).

Both Stratolene and Stratosene may be used for many applications formerly performed with carbon tetrachloride mixtures, thus diminishing sharply the toxicity hazards from solvent fumes. Both solvents are available in 53 and 5 gallon drums.

Highest Precision
HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud *has* to be right—every feature *is*. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

Henry W. Brown
PRESIDENT

THE BROWN CORP.
213 BELLEVUE AVE. SYRACUSE, N. Y.

FRAM stands for QUALITY

In major plants across the nation, in modern laboratories and engineering facilities, the byword at Fram is *quality*. It's the kind of quality that comes from precise filtration engineering translated into vast production.

From these plants have come the Fram Firsts that advanced engineered protection for the products of the automotive industry. Fram quality has molded the decision of over 70 leading manufacturers of cars, trucks, tractors, buses and engines to use filters embodying the Fram Principle of Oil Filtration on some or all of their vehicles.

Bring your filtration problems to Fram. FRAM CORPORATION, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

Manufacturers of...

FRAM OIL & MOTOR CLEANERS • FRAM FILCRON REPLACEMENT CARTRIDGES • FRAM CEL-PAK REPLACEMENT CARTRIDGES • FRAM FILTRONIC REPLACEMENT CARTRIDGES • FRAM CARBURETOR AIR FILTERS • FRAM GASOLINE FILTERS • FRAM CRANKCASE AIR FILTERS • FRAM POSITIVE CRANKCASE VENTILATORS • FRAM RADIATOR & WATER CLEANERS • FRAM FUEL OIL FILTERS • FRAM INDUSTRIAL OIL AND FUEL FILTERS • FRAM COMBINED SEPARATOR-FILTER FOR IMMISCIBLE LIQUIDS • FRAM CUSTOM-DESIGNED FILTERS FOR SPECIALIZED APPLICATIONS.

FRAM
OIL • AIR • FUEL • WATER
FILTERS

GET THESE TIME-PROVED

for the Tops in Threading Performance

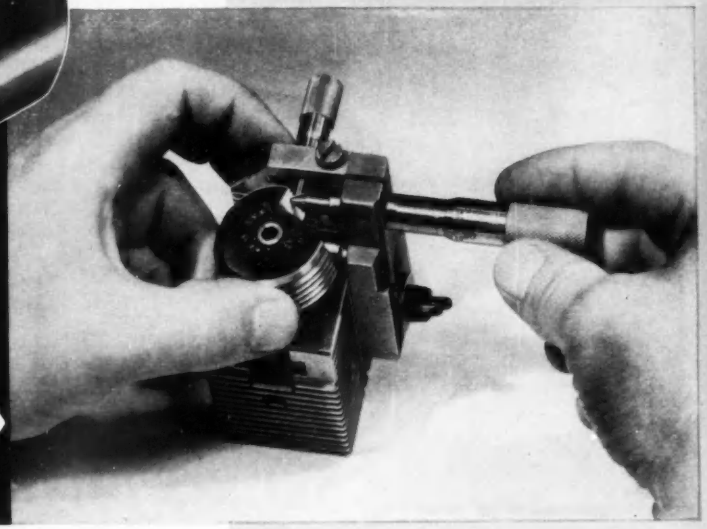
THEY'RE
– LIGHT-WEIGHT
– BALANCED
– PRECISION-BUILT

FOR LONG RUNS

with Long-Life Circular Chasers

Head Sizes: Straight Threads 1/4" to 9/16"
Pipe Threads 1/8" and 1/4"

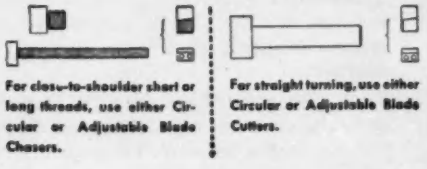
The famous Namco Double Barrel Micrometer Gauge insures identical check on uniformity of all chaser cutting edges, whether you use circular or adjustable blade chasers.



BOTH USE GROUND-THREAD PRECISION CHASERS

- Namco Vers-O-Tool Circular Chasers are regrindable through a full 270°—and Vers-O-Tool Adjustable Blade Chasers are designed to give more regrinds than conventional types, with the blade adjustable to proper cutting position for any type of material.
- One micrometer gauge serves both circular and adjustable types. A minimum adjustment of .008" for economical regrinds insures a freshly ground chaser always at correct cutting position.
- Vers-O-Tool Heads, too, are hardened and ground throughout.
- Quick removal and replacement of chasers or blocks is made by loosening only two screws.
- Vers-O-Tool Heads are provided with radial adjustment for wear on all sizes. Diametric adjustment is made by one screw. Both adjustments take less than two minutes.

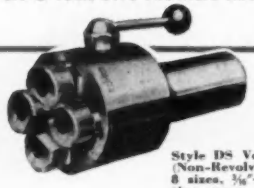
YOU CAN USE



For close-to-shoulder short or long threads, use either Circular or Adjustable Blade Chasers.

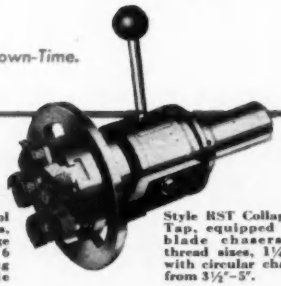
For straight turning, use either Circular or Adjustable Blade Cutters.

Vers-O-Tools Give You More Threads pe: Dollar, with Closer Tolerances and Less Threading Down-Time.



Style DS Vers-O-Tool (Non-Revolving Type), 8 sizes, 3/16"–4 3/4" cutting range.

Style DR Vers-O-Tool (Revolving Type), 12 sizes, .056"–4 3/4" cutting range with circular chasers; 6 sizes, 3/16"–1 3/16" cutting range with adjustable blade chasers.

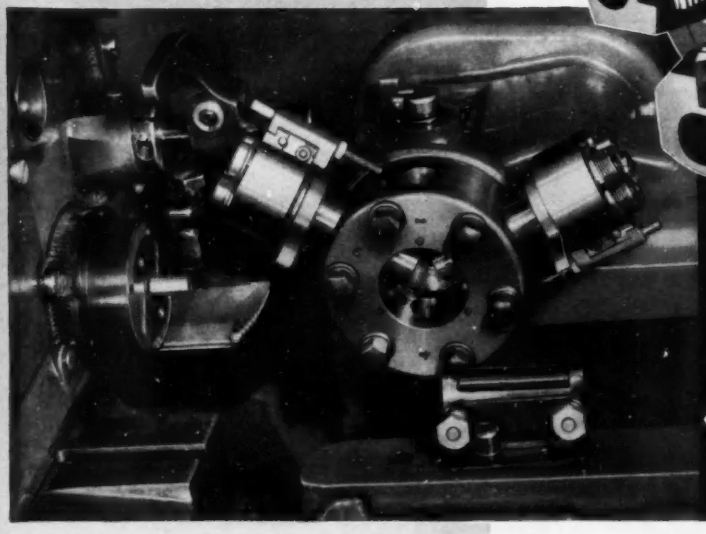


Style RST Collapsible Tap, equipped with blade chasers for thread sizes, 1¼"–4"; with circular chasers, from 3½"–5".

DBS VERS-O-TOOL TWINS

on Brown & Sharpe Automatics

THEY'RE
– Designed Especially for B&S • Size 00 Size 0 • Size 2



FOR SHORTER RUNS

with Economical Adjustable Blade Chasers

Head Sizes: Straight Threads 3/8" and 9/16"
Pipe Threads 1/8" and 1/4"

Typical application of Namco Type DBS Vers-O-Tools on a Brown & Sharpe Automatic. One head is using Circular Hollow Mill Cutters; the other, Ground Thread Circular Chasers.

EITHER TYPE

For profile and-forming, use either Circular or Adjustable Blade Chasers.

For fine threads, Circular Chasers take you down to 200 pitch; Adjustable Blade Chasers, down to 60 pitch.

VERS-O-TOOL HEADS ARE DESIGNED FOR DOUBLE DUTY

- Namco Circular and Adjustable Blade Chasers are interchangeable, *using the same Vers-O-Tool Head*, size for size, on the 3/8"–9/16" blade types and on the 1/4" circular type.
- You can use Namco Circular or Adjustable Blade Cutters (interchangeable with same size chasers) for plain turning—and Vers-O-Tools leave no "cork screw" spiral when withdrawn from the work.
- Namco Vers-O-Tools provide close-to-shoulder threading because of positive, trigger-quick tripping action. Head is locked when it should be closed, always open when it should be open—*no blanks*.

For complete information on these *proved-in-use* Brown & Sharpe Type DBS Vers-O-Tools, and others in the famous versatile Vers-O-Tool Family, ask for Catalog D-49.

Stock Delivery on Heads and Chasers for All National Coarse and Fine and Taper Sizes. Special Adjustable Blade Orders, Usually One Week.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

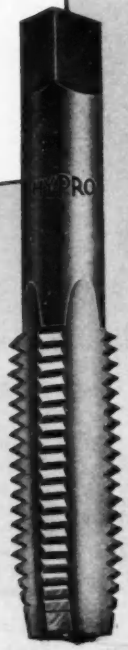
Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

Are you troubled with "THREADACHES" in your Tapping Operations?

Here's Your Prescription—

℞ For immediate relief—apply HY-PRO taps with correct speed, feed and lubrication. Continue treatment for complete cure. More accurately threaded holes will result, and your assembled parts can be fastened tighter, stronger to resist vibration

ORDER THRU YOUR DISTRIBUTOR



PRESCRIPTION TAPS

From simple ailments to serious breakdowns in tapping operations, HY-PRO Taps are prescribed with every assurance of a complete recovery.

Extremely tough and rugged, HY-PRO Taps maintain their built-in accuracy to provide more accurately threaded holes per tap . . . longer life on the job . . . higher production at less cost.

For every type of Tapping "threadaches" there's a sure cure HY-PRO Tap expertly prescribed by specialists in our Engineering Department.

HY-PRO TAPS

COMMERCIAL • PRECISION
SPECIAL
Ground Thread Taps

HY-PRO TOOL CO.
New Bedford, Mass., U.S.A., *A Subsidiary of Continental Screw Co.*

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 85)

C-26—Surface Finish Comparator

A Precisionaire surface finish comparator placed on the market by the Sheffield Corp. of Dayton, Ohio, is used for comparision of surface finish or surface roughness on flat or curved surfaces having a diam greater than 3¾ in., where the surface roughness ranges from 30 to 500 micro-inches "rms." The instrument does not give a direct micro-inch "rms" reading, but shows a reading which is actually a measurement of the escapement of air over a circle of approximately ⅛ in. in diam.

Sheffield Precisionaire surface finish comparator.

There is an advantage in measuring surface finish over an area instead of on a line, especially when determining quality of finish of a bearing surgace, it is pointed out. For example, it is possible for a sawtooth surface to give much the same reading on an "rms" line measuring instrument as a relatively smooth surface in which there are a few deep scratches. With the Precisionaire, the company explains, the latter surface would actually be indicated as a good bearing surface. But a sawtooth surface would be revealed as unsatisfactory for bearings.

The present model gives repetitive readings in the comparison of surface finishes, one finish with another, or with a selected standard. It can also be used in establishing readings on surfaces to be used as standards. Any number of readings may be taken in quick succession, as rapidly as the gaging head can be manually presented to the work, with no special skill or operator training necessary. It requires very little bench room, approximately 6 in. by 6 in., and

Now, more than ever before, America must make full use of its steel-making capacity and conserve its natural resources. Now, more than ever, there is national significance in the phrases, "*Make a ton of sheet steel go farther*" and "*Make your product last longer.*"

These low-alloy, high-tensile steels do "make a ton of sheet steel go farther"—for their inherently higher strength is 50% greater than mild carbon steel. That means, in turn, that 25% less section can be used with safety, and where rigidity is important, this can usually be compensated for through slight design change.

"Make your product last longer" is no idle claim. The much greater resistance of N-A-X HIGH-TENSILE to corrosion, abrasion, and fatigue assures longer lasting products even at reduced thickness.

Explore the potential economies to be derived from the use of low-alloy, high-strength steels—and then specify them. Their use can add materially to our national conservation program.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division, Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

PRODUCER OF N·A·X HIGH-TENSILE STEEL

NEW PRODUCTS

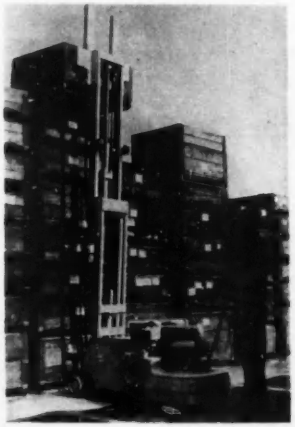
is designed for use in the shop as well as in the laboratory.

The Precisionaire surface finish comparator is supplied complete with right-hand scale—20 to 110 micro-inches; left-hand scale (graduations in black) —100 to 300 micro-inches, and (graduations in red)—300 to 500 micro-inches. The instrument may be attached to any plant air supply line or air compressor supply.

C-27—Higher Telescoping Lift Truck

Addition of 11 in. of lift to its tilting telescopic Transtacker is announced by

For additional information please use coupon on page 60



Automatic tilting telescopic Transtacker, the SCLT.

the Automatic Transportation Co., Chicago, Ill. The unit is one of six driverled electric stackers, of the suspended fork type, just added to Automatic's "101" line.

The tilting and telescopic unit, called the Model SCLT, is accompanied by a non-telescopic unit, the SCL, and the SCX, which is designed for use where neither tilt nor telescopic lift are required. These are rated for 2,000 lb, 48-in. long loads. Three similar models have been designed for heavy duty operations. This trio is rated for loads 48 in. long weighing 2,500 lb. The increased lift means that the SCLT Transtacker now tiers to 131 in.

Its new design makes the truck shorter by five and one-half in. and lighter by 650 lb., affording lower aisle requirements and shorter turning radius.

Brake is on the motor shaft, operating through the entire gear reduction. The gear drive unit provides first reduction chain and second reduction spur gear.

The Transtacker operates in both speeds, either forward or reverse, with the handle upright, which is equivalent to reducing overall length by another foot. Smooth starting is assured since the stacker cannot be started in second speed and must go through first.

C-28—Plating Tank Converter

Automotive Rubber Co., Detroit, Mich., has designed a converter for present plating tanks, to permit operation with the new method of plating known as diaphragming. Diaphragm plating provides for segregation of anode and cathode compartments by means of canvas duck screens.

The object is to produce smoother

Improved Product Performance
...one of 6 advantages of
Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS

Planetary inbuilt speed reducer permits a straight-line drive, symmetrical construction; insures good performance.

Helical geared fuel transfer pump motor having maximum output with minimum weight. For aircraft, but adaptable to other uses.

A motor engineered to the exact requirements of your product generally results in greatly improved product performance.

Lamb Electric Motors, built to precision standards of high quality materials, also make available: reduced *product* weight, increased dependability, compactness, improved appearance and lower cost. We shall welcome the opportunity to discuss these benefits in terms of your products. *The Lamb Electric Company, Kent, Ohio.*

Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER MOTORS

Inclusion-free high-carbon ferro chromium

assured by new process

MOST ball and roller bearings must take terrific punishment in service, and their dependability is based directly upon the quality of steel from which they are made.

To meet the requirements of the bearing manufacturer and his customers, the steelmaker can rely upon our newly improved ferro chromium to help him produce consistently high grade bearing steels.

The high-carbon ferro chromium we have recently developed is exceptionally free from non-metallic inclusions, entrapped slag and dissolved gases. It is made by a new process* which includes filtering out harmful inclusions by pouring the metal, as tapped from the furnace, through a layer of molten slag of special composition. In addition to removing the undesirable inclusions, this process also assures greater density of the metal and the absence of shrinkage cavities in individual lumps.

High-carbon ferro chromium contains 66 to 70 per cent chromium, 4 to 6 per cent carbon, and 3 per cent maximum silicon.

Our technical staff will be glad to demonstrate to you the benefits to be gained in your steelmaking by the use of this improved high-carbon ferro chromium. *Patented

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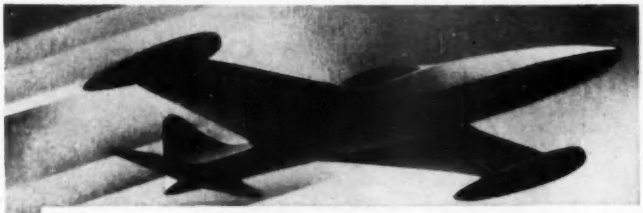

Alodine®

BONDS PAINT TO ALUMINUM AND PROTECTS THE METAL

EASY TO USE
Process is foolproof and chemical solution can be applied by dipping, spraying, brushing or flow-coating.

ELECTROLESS
Alodizing is a chemical conversion process.

ECONOMICAL
Low chemical cost, short coating time and low temperature keep overhead down.

EFFECTIVE
The tough, durable Alodized surface makes paint stick to aluminum and resists corrosion. "Alodine" meets these Service specifications: MIL-C-5541; MIL-S-5002; AN-E-19; AN-F-20.

Brush Alodine®

Brush "Alodine" is easily and quickly applied to assembled aircraft in the field, shop, or hangar. Cleaning and coating chemicals for Brush Alodizing are shipped in bulk or in the convenient Brush "Alodine" Chemical Kit No. 1. This Kit contains enough chemicals to treat about 1000 square feet of surface and is an ideal package for use at airfields of commercial airlines or of the Armed Services anywhere.

Use "Alodine" and Alodized Aluminum for Maximum Product and Finish Durability!

STANDARD RUST PROOFING PRACTICE THE WORLD AROUND
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AMERICAN CHEMICAL PAINT COMPANY

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Manufacturers of METALLURGICAL, AGRICULTURAL and PHARMACEUTICAL CHEMICALS

NEW PRODUCTS

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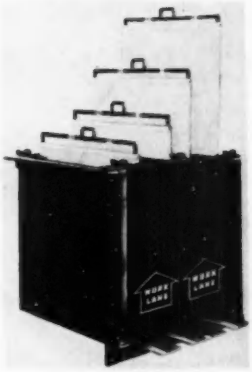
plated surfaces, allow higher current densities and eliminate polarization. The anode solution is pumped off, filtered and passed to the cathode compartment free of insoluble metallics and organics which form at the anode and ordinarily deposit on the work pieces.

Installed in tanks where size of the work permits, without major expendi-



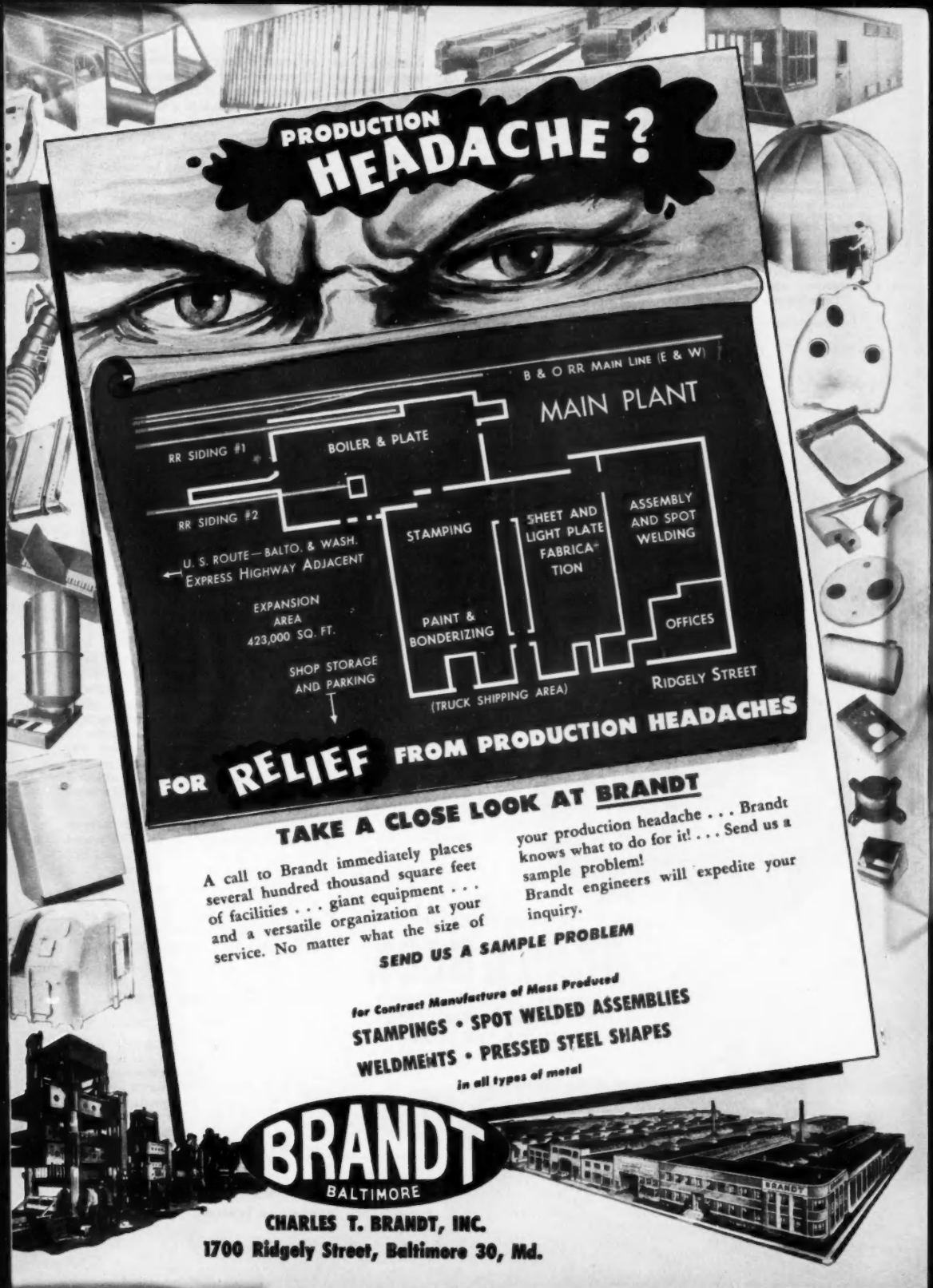
Automotive Rubber Co.'s plating tank converter.

ture, the conversion unit consists of fabric sleeves that slide on rubber insulated metal frames which in turn slide into insulated channels with the cathode side or work land protected by insulated woven wire guards.

Diaphragm converter sections can be constructed for tanks of any width, length or compartment with single or multiple work lanes.

C-29—Semi-Automatic Valve Grinder

A semi-automatic valve grinder put out by Norton Co., of Worcester, Mass., is designed to meet the needs of the automotive and aircraft industries for a valve grinding machine which combines high speed production with semi-automatic operation, high precision, and fine finish. The machine grinds the faces of automotive and aircraft type valves having face angles of 0 degrees through 62½ degrees, with face diameters of 7/16 in. through 3½ in, and with stem diameters up to and including ¾ in. Movement of a single lever clamps the workpiece in the work head collet, starts the grinding cycle, rotation of the workpiece, and coolant flow. A simple adjustment provides for fine



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for Contract Manufacture of Mass Produced

STAMPINGS • SPOT WELDED ASSEMBLIES

WELDMENTS • PRESSED STEEL SHAPES

in all types of metal

BRANDT
BALTIMORE

CHARLES T. BRANDT, INC.
1700 Ridgely Street, Baltimore 30, Md.

NEW PRODUCTS

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feed, becoming operative at any point in the wheel feed cycle from 0.005 in. oversize to zero. Spindle reciprocation also contributes to quality of finish and improved wheel cutting action.

Termination of the grinding cycle on completion of the grind is brought about automatically by an electric timer. Termination of workpiece rotation, coolant flow, and unclamping of the workpiece also occur automatically on completion of the cycle.

The spindle of the work head unit carries a draw-type, hydraulically operated, chuck for holding the workpiece. A radially adjustable face plate provides for centralizing the workpiece in the chuck with respect to the center of the spindle, and end-stops control location of the ground surface relative to the wheel.

The work head unit swivels through an arc of 67 deg on a swivel plate having micrometric adjustment. This plate is mounted on a sliding table, and movement of the unit into grinding position, or movement of it away to provide clearance for wheel removal, is accomplished by a handwheel.

Wheel truing is done by means of a wheel guard truing device, operating automatically and at the will of the operator through hydraulic power.

C-30—Lightweight Tractor

Automatic featherweight 1510 lb. tractor

Designed to tow loads as heavy as 10 tons, a 1510-lb featherweight tractor put out by the Automatic Transportation Co., Chicago, Ill., permits plant personnel to cease using large tractors to carry uneconomically small loads.

This battery-operated tractor, believed to be the smallest rider-type tractor yet engineered, develops ultimate drawbar pull of as much as a thousand pounds, according to Automatic.

The tractor is tailored for narrow aisle and cramped quarters, its frame measuring 19 in., its length 45 in., and at the broadest point 30 in. wide.

The tractor features full magnetic contactor control, large padded seat, accommodation for cushion type, solid, or pneumatic tires and standard interchangeable Transporter batteries.

C-31—Non-Consumable Electrode

Thoriated tungsten, long used in electronic tubes because of its excellent electron emission characteristics, is now available from Air Reduction, New York, N. Y., as a non-consumable electrode (Thor-Tung) for Heliwelding—Airco's inert-gas-shielded arc welding process. The new electrode has proven valuable in DC straight polarity weld-

(*Turn to page* 103, *please*)

Engineered by

BORG & BECK®

means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!

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CLUTCHES . . . FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD

Reg. U.S. Pat. Off.

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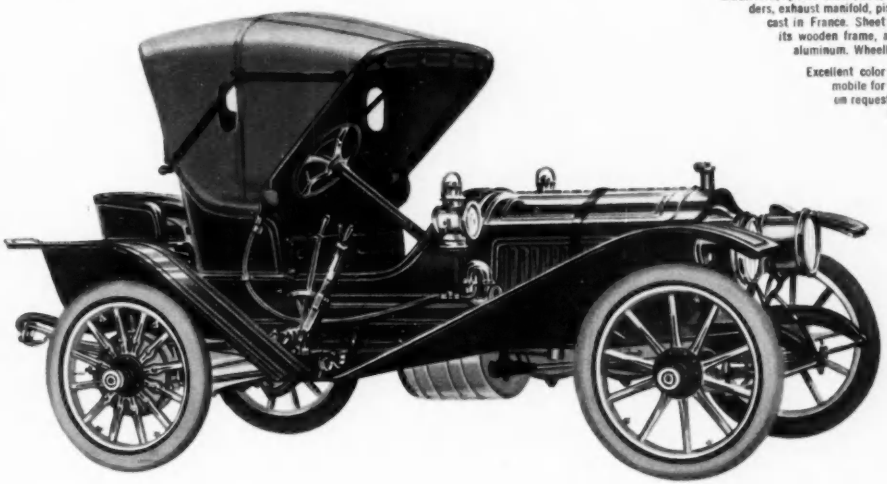
BW

BORG & BECK DIVISION
Borg-Warner Corporation
CHICAGO 38, ILLINOIS

Your 1909 Packard "Thirty" Runabout sold for $4200, with top, windshield, special colors, etc., extra. The car's four cylinders, exhaust manifold, pistons and piston rings were cast in France. Sheet aluminum panels covered its wooden frame, and fenders were made of aluminum. Wheelbase 123½", tires 36" x 4".

Excellent color reproduction of this automobile for framing will be sent to you on request. Please use your company letterhead. Supply limited.



Ask the man who owns one.....

THIS was more than an automobile. To many a successful man it was a symbol of his success. Frequently, from the mere fact of possession, it served to project the personality of its owner in a way that filled a soul-satisfying need.

Who, then, could measure the value of a 1909 Packard? Wisely, the men who made and sold them said . . . "Ask the man who owns one . . ."

We have come to believe that its builder poured his heart into the making of this fine car. His heart, his creative spirit, became a part of the car.

Thus, the proud owner of a Packard found in his automobile a visible expression of his own creative nature . . . an expression in line . . . and color . . . in pleasing line . . . and warm, appealing color.

R-M

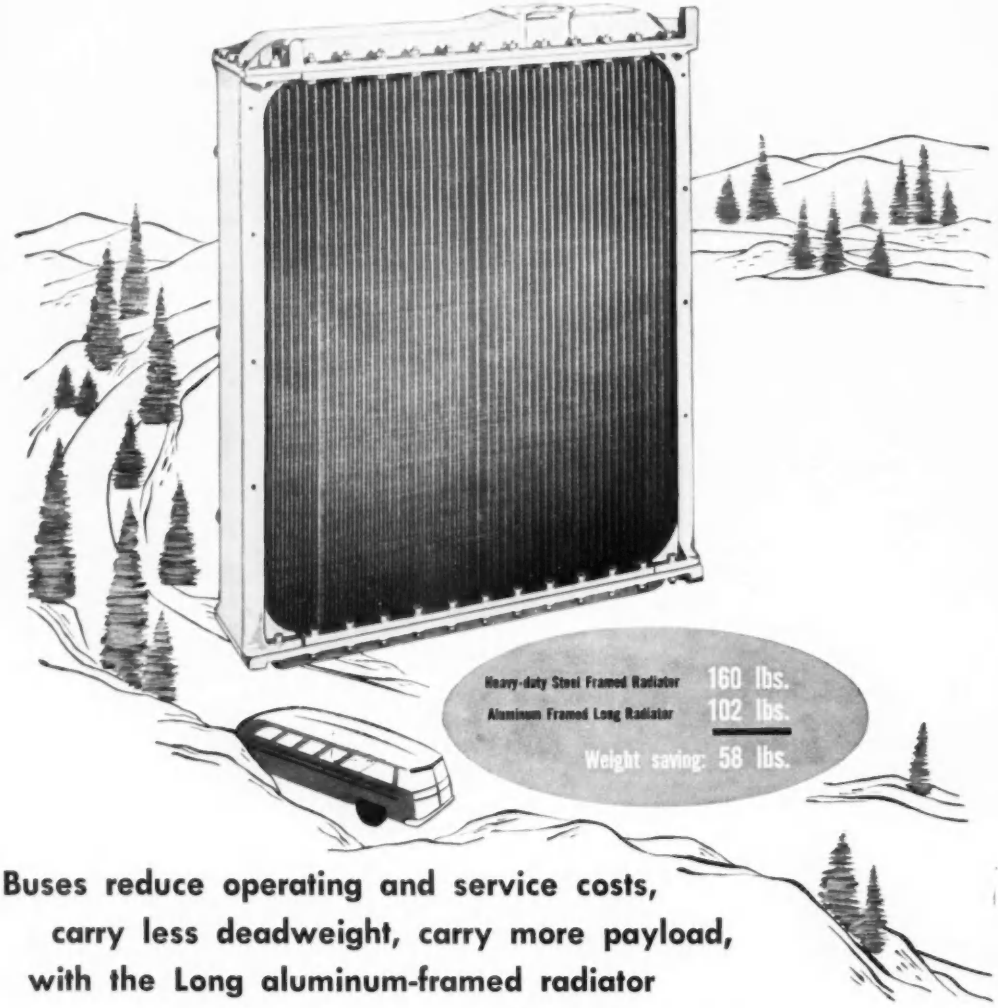
REG. U.S. PAT. OFF.

RINSHED-MASON COMPANY

DETROIT 10, MICHIGAN
ANAHEIM, CALIFORNIA

"Proudly the automotive world displays the lustrous beauty of R-M Lacquers"

America's leading manufacturer of fine lacquers, enamels and undercoats for automobiles, trucks, farm equipment, appliances, and numerous other products of industry. We invite your inquiry.



Buses reduce operating and service costs, carry less deadweight, carry more payload, with the Long aluminum-framed radiator

This entire radiator frame—upper and lower tanks and the sides—is made of aluminum, cutting weight over 36%. It is easier to service. It involves no change elsewhere in the cooling system and it stands up under heavy-duty bus operating conditions. Since 1903 we have been specialists in the design and production of balanced cooling systems for internal combustion engines.

LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS
OIL COOLERS

A PRODUCT OF BW BORG-WARNER

LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION

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NEW PRODUCTS

For additional information please use coupon on page 60

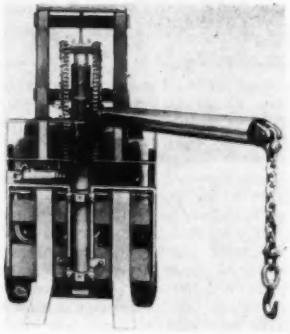
(*Continued from page* 100)

ing operating much cooler than standard tungsten electrodes, and permitting use of higher currents on given size electrodes. Further, Thor-Tung has excellent arc stability not only at these high currents, but also at currents lower than those possible with conventional tungsten electrodes, according to Airco.

Since Thor-Tung runs cooler and does not become molten, consumption is almost negligible and contamination resulting from accidental or deliberate touching is eliminated. Touch-starting thus becomes a practical operation, even at low currents.

Because of its permanency, Thor-Tung may be "pointed" to permit continued operation at extremely low currents. This new DC straight polarity method of Heliwelding aluminum, using Airco Thor-Tung electrodes and helium as a shielding gas, not only eliminates the special problems heretofore encountered in AC Heliwelding, but also provides a hotter, more stable and more efficient arc which produces deeper penetration and faster welding with lower gas consumption per foot of weld and less distortion.

C-32—Fork Truck Crane Arm



Latest specialized materials handling development of Towmotor Corp., Cleveland, Ohio—a slewing crane arm—permits rapid, easy positioning in freight cars of loads up to 800 lbs at 80 in. load center. The crane arm pivots so that a two-way hydraulic cylinder can swing it laterally 20 deg to either side of center. The arm is readily detachable so that the truck can be used with standard pallet forks. The illustration shows the crane arm and forks mounted together on the carriage of a Model LT-44 Towmotor Lift Truck. The hydraulic cylinder actuates the arm

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Jet Fighter Production

(*Continued from page* 35)

which develops 5000 lb thrust. As a result, top speed is materially above 600 mph. Radius of action is better than 850 miles and its service ceiling is set at above 45,000 ft. This performance makes the plane particularly efficient for ground support operations, interceptor, and penetration requirements.

Firepower for ground support and other purposes includes six 50 cal. machine guns, eight 5-in. HVAR (high velocity aircraft rockets), 2000 lb of bombs, two 100 or 500 lb fragmentation clusters, aircraft depth charges, incendiary bombs, and napalm tanks. Combinations of the above may be used, according to the mission required. The cleanliness of the Thunderjet design is preserved through retractable or jettisonable rocket and bomb holders.

Improved maintenance and accessibility are provided for by means of some 180 access doors, enabling ground crews to service the plane rapidly between missions—and such items as retractable battery lift, hinged gun deck, guide rails, snap-on electrical leads and throttle disconnects for rapid engine interchangeability.

Aerodynamic fins on the tip tanks enable the airplane to go through maneuvers even under full load conditions with tip tanks on, said to be the first time this has been possible with any jet fighters to date. A new and improved cabin pressurization and air conditioning system is provided for maximum pilot conditions at all altitudes and at extremely low or extremely high outside temperatures.

The F-84F, newest version in the line of Republic Thunderjet fighters, incorporates swept back wings and tail surfaces replacing earlier F-84's straight wing configuration.

Speed of the new jet has not been announced, but its performance exceeds that of the F-84E. The F-84F is equipped with a more powerful Allison J-35 model than its predecessor.

The F-84F may carry two 450-gallon wing external tanks. Like earlier versions of the F-84 it carries six caliber .50 machine guns. It can also carry 24 5-in. rockets, or two 1000-lb rockets, or two Tiny Tims. It is equipped with four RATO (rocket assist take off) units.

Dimensions of this new plane are: Wing span, 34 ft; overall length, 38 ft; and height to the top of the rudder fin, 14 ft. At maximum gross weight for take-off, the plane will weigh approximately 25,000 lb.

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Plymouth '51

(*Continued from page* 41)

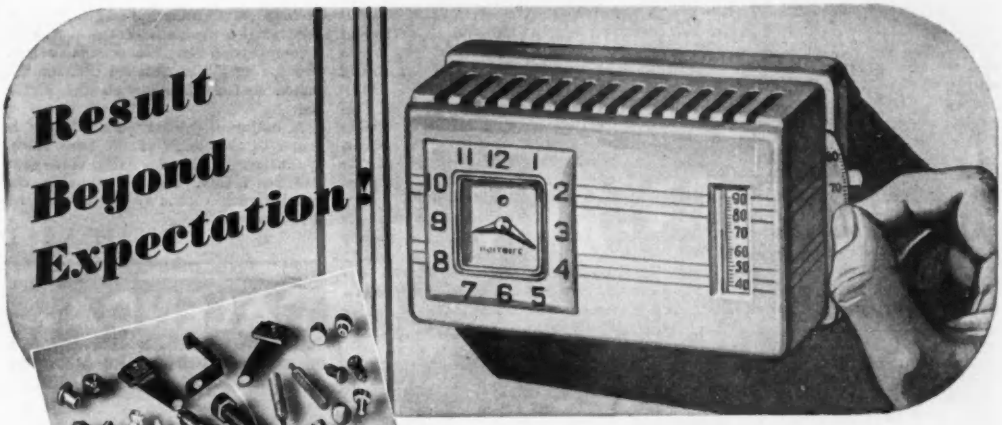
carriers for those who require large cargo capacity. The Savoy, companion of the Suburban, provides a greater variety of luxurious interior appointments and more exterior refinements to enhance the car's appearance.

An outstanding feature of the 1951 Plymouths is the use of an improved shock absorber, the Oriflow. Developed by Chrysler, and being produced at its New Castle plant, the Oriflow shock absorber has been released for installation on all Chrysler Corp. cars for 1951. It is said to provide a smooth ride on all types of roads and to be particularly effective on extremely rough roads.

Basic construction of the Oriflow is similar to that of the previous shock absorber. The significant difference between the Oriflow absorber and the previous absorber lies in the method of controlling fluid flow through the piston and the base valve.

Simplicity of construction is readily apparent from the Oriflow section view in this article. Then fewer parts are

(*Turn to page* 106, *please*)



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used in the new unit. Larger attachment studs, bushings and rings are required with the Oriflow shock absorber due to the greater resistance loads employed.

In the Oriflow shock absorber, the restrictive passages are of a long, small diameter, tubular nature in which the resistance to fluid flow increases much more gradually with respect to the fluid or piston velocity. Consequently, resistances at mid-stroke far in excess of those possible in the previous shock absorber can be utilized without incurring undesirable ride harshness and vibration. It is in this part of the stroke, after the initial high accelerations have been reduced, that damping is most effective in control of the suspension system and can do its work without the passengers being aware of it.

This combination of gradual resistance increase and higher available resistances when needed is the reason for the smoother, better controlled ride said to be obtained in cars equipped with the Oriflow shock absorber.

Referring to Oriflow drawing, the piston incorporates two concentric rings of tubular passages connecting the upper and lower ends of the cylinder. The outer passages are small in diameter and open to the cylinder at both ends. Inner passages are covered at the top face of the piston by a compression relief valve consisting of two spring plates clamped between the piston and a shoulder on the piston rod.

A major simplification of design is found in the detail of the base valve. It consists simply of a check valve seat and an orifice, the latter being the small diameter tubular passage in the check valve.

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Plant Maint. Show & Conf., Cleveland ..... Jan. 15-18

Soc. of Plastic Engrs., New York City ..... Jan. 18-20

Truck-Trailer Mfrs. Assn. Annual Convention ..... Jan. 21-23

4th Annual Hot Rod and Motor Sports Show, Los Angeles ..Jan. 25-28

Inst. of the Aeronautical Sciences, New York City ..... Jan. 29-31

Nat'l Auto. Accessory Mfrs. Assoc., New York ..... Feb. 5-8

Los Angeles Motor Car Dealer Assn., 29th Automobile Show, Los Angeles ..... Feb. 16-25

SAE Passenger Car Body & Materials Mtg., Detroit ..... Mar. 6-8

International Auto Salon, Geneva, Switzerland ..... Mar. 8-18

Amer. Soc. Tool Engrs., New York City ..... Mar. 17

Western Metal Exposition and Congress, Oakland, Calif. ..... Mar. 19-23

Pacific Automotive Show, Seattle Mar. 21-24

Salone Internazionale Dell Automobile, Turin, Italy ..... Apr. 4-15

British Automobile and Motor Cycle Show, New York City ..... Apr. 15-23

Amer. Soc. Lubricating Engrs., Phila. ..... Apr. 16-18

Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City ..... Apr. 17-20

1951 Metal Powder Show and 7th Annual Meeting of Metal Powder Assn., Cleveland, Ohio ..... Apr. 25-26

Chamber of Commerce Annual Mtg. Washington, D. C. ..... Apr. 30-May 2

Materials Handling Conference, Chicago ..... Apr. 30-May 4

A.E.R.A. Convention, Chicago ....May 7-9

Nat'l Air Races, Cleveland Airport May 19-20

Amer. Society for Quality Control, Cleveland ..... May 23-24

Third World Petroleum Congress, The Hague, Scheveningen, Holland ..... May 28-June 6

American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va. ..... June 4-6

American Society of Mechanical Engineers semi-annual meeting, Toronto, Canada ..... June 11-15

American Society for Testing Mat'ls Annual Meeting, Atlantic City, N. J. ..... June 18-22

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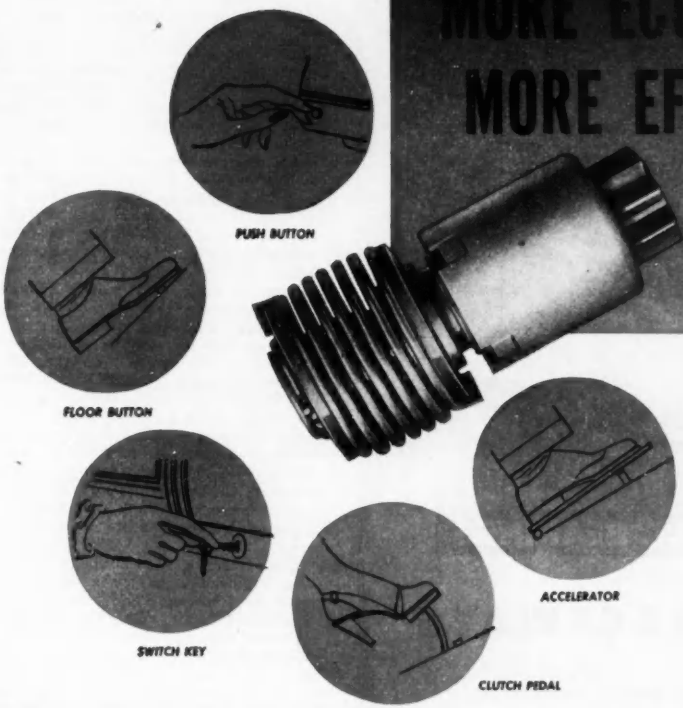

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Jettisonable Fuel Tank

(*Continued from page* 44)

300-gallon jettisonable wing tip tank for the Neptune brought into study and discussion the aforementioned problems. The optimum external design was a cylindrical stream line shape 34 in. in diameter and 16½ ft long. The best production design was obvious—two half shells to be joined by some method of welding. However, it was found that Lockheed's drawing press, a 1500-ton Clearing, was as big as any on the Coast but lacked 2½ ft of being long enough. A suitable welding fixture would also be required which would take time and money to design and build.

The loads considered in the design consisted of the dead weight inertia load with factors imposed for the various flight and taxiing loads. Flight data substantiated wind tunnel tests.

The spacing of the two main bulkheads was established by the necessity of mating with the wing tip attachments. A minimum of baffles were to be used, the most critical condition developed as that in which the tank was approximately half full when the calculated pitching moment would cause maximum surge and resultant load transfer to either front or rear of these main bulkheads. Also, under this condition, maximum bending and shear loads would be imposed on the half shells. The main bulkheads were also designed to take the spanwise loading occurring during the aileron roll condition. The vertical shear loads mainly dictated the number and size of the stiffeners on the bulkhead webs. These stiffeners also helped support the bulkhead webs against any eccentricities imparted by the shackle tension fittings.

It was considered desirable to spotweld bulkhead rings to the skins to avoid rivet sealing. The usual procedure is to form the bulkhead on a rubber press and then use the spotwelder electrodes as clamps to force them and the skins into contact for welding. The welds, thus preloaded in tension, are readily suspectible to failure after a few flights and spotwelding is then eternally damned by engineering.

The problem was solved by separately attaching the bulkhead rings to the skins. A subassembly was then made of the main bulkheads, stiffeners and longitudinal supports as shown in Fig. 1.

Proceeding with the basic premise of two half shells, outriggers were designed for the 1600-ton press to accommodate a die and hold-downs of the required length. These half shells were to be drawn of 61SW aluminum alloy sheet, 0.081 in. thick, the best compromise for all factors of strength, rigidity, drawing and weldability.

Because of the streamlined tank

(*Turn to page* 110, *please*)

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shape, a bottomless die, rather than a more costly full cavity die, was planned on the basis of experience gained in the production of drop tanks for P-38 and F-80 airplanes. With the contemplated draw rings nearly 20 ft long, it was estimated that 450 tons of hold-down pressure and 300 tons of draw pressure would be required. Actually, the full 500 tons' clamping pressure capacity of the press was used in the final sizing of the part. The outriggers, extending 32 in. beyond each end of the 14 ft press platen, carried five pressure pins used to control clamping forces at the extreme ends of the draw rings. Deflection of the outriggers under full load proved to be less than 0.015 in.

The hold-downs were cast in segments of Kirksite and made eight in. thick to minimize warpage and deflection. Tied together by steel splice bars, this assembly with 6100 sq in. of clamping area weighed 22,000 lb. The upper half shell required a depression in order to fit close under the wing and the bottom half had to have a depression to accommodate a pump. A Kirksite punch was cast in three sections. Two interchangeable center portions were made, each forming one of the required depressions when entered by a bottoming pad mounted inside the die on the platen of the press where it was operated by the cushion pins. The die was cleared to metal thickness and the draw radius set at ½ in. A general view of the press and drawn half shell is shown in Fig. 2.

It was first decided that the forming would be in the nature of a conventional draw operation to within the last inch of draw, at which time blank restraint would be increased and the part finish stretched. However, best results were achieved by partially forming the shell in the annealed condition, heat treating to 61W and finish forming as soon thereafter as practicable. First draw was to within one in. of bottoming.

A blank size of 60 in. by 216 in. with corners reduced worked well, no puckers occurring along the sides and the ends ironing out. Some failures occurred at the tail end, but these were overcome by reducing the blank in this area and allowing the metal to pull out from under the drawing. The first shells were surprisingly accurate with little longitudinal bow.

A considerable number of tests were run to determine the optimum half shell joint configuration. Due to the previously mentioned aerodynamic requirements, a butt weld was a must. However, the abutting edges of the two half shells would have to fit accurately and be held firmly to produce a good joint strengthwise and without steps and bulges. Two special extrusions were designed to fit inside the shells at the weld joint for the purpose of maintaining the desired alignment. The separate segment around the nose was stretch formed to contour while the side segments were sprung into place at the time of attachment. After trimming, these were seam welded to the half shells. It was found that the location of the seam weld was critical in relationship to the joint areweld. If too close, heat was pulled from the arc-weld too swiftly, the extrusion acting as a chill strip. If too far away, the spotwelds were pulled by distortion in the arc weld.

Automatic welding was considered the only practicable method of joining. A rod feed mechanism was obtained, and tests showed that feeding characteristics and speed controls were satisfactory for this type of work. The device feeds a continuous spool of welding wire by means of variable speed power-driven serrated rolls. The rod is directed toward the welding arc through a tube and nozzle. It was found that the direction and location of the rod entering the arc was critical. It was also found by tests that the rod should contact the work prior to and during the time that it was entering the arc stream. The geometry of the weld bead could be varied by adjustments in welding speed, rod feed speeds, and heat settings.

One entire side was welded in one pass to within six in. of each end. The tank was then reversed in the jig and a

(*Turn to page* 112, *please*)

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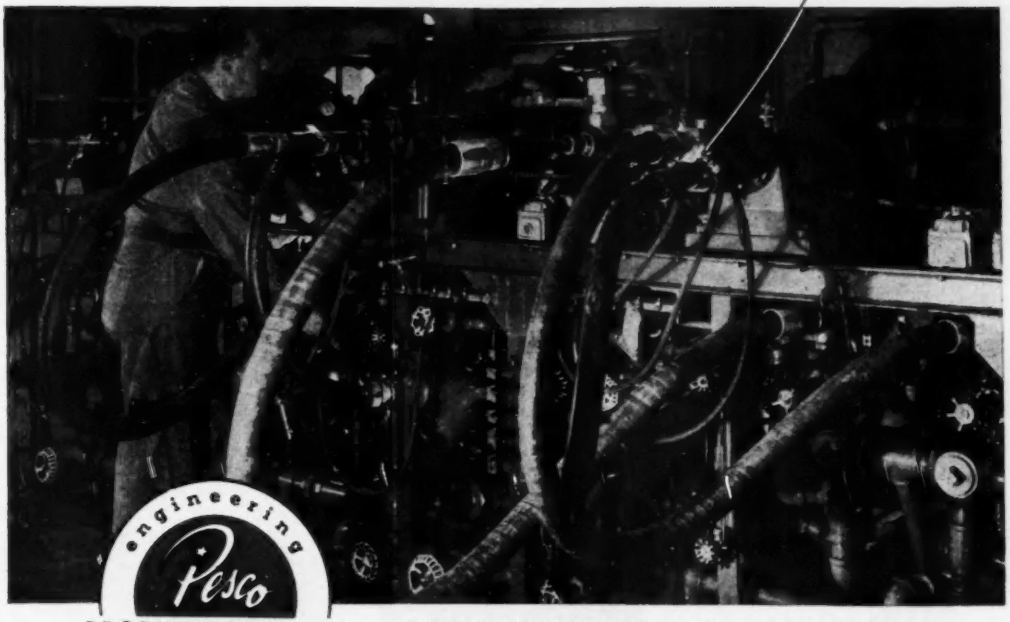

engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD BEDFORD, OHIO

pass made on the other side. After removal from the jig, the ends were finished manually.

After completion of the weld assembly, the transverse rings in the nose and aft portions were riveted across the weld line by means of tabs. These tabs eliminated the need for separate splice plates. The main bulkhead rings were joined by means of typical bolted splice plates. The shackle and sway brace bolts were then installed, the former in tension fittings mounted on the web stiffeners with ½-in. bolts.

All faying surface rivet and bolt attachments which might cause leakage were given a spray coat of thiokol latex compound prior to assembly and after assembly, all such joints and seams were given an additional spray coating of the same material. Wet primer was used on the shackle and sway brace bolts also.

Although all aluminum alloys were anodized and steel alloys cadmium plated, as additional insurance, the entire interior of the tank was given a final coat of corrosion preventative compound after the thiokol compound had cured for 24 hours. The access doors were sealed by means of Buna-N type gaskets.

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity in mid-December continued at a level substantially above that of a year ago. Increases during this period were reported in department store sales, bituminous coal production, construction, electric power output, railway freight loadings, and crude oil production. For the week ended Dec. 16, the *New York Times* index of activity stands at 175.2, as compared with 174.6 in the preceding week and 151.5 a year ago.

The dollar value of department store sales in the week ended Dec. 16, as reported by the Federal Reserve Board, was equal to 640 per cent of the 1935-39 average, as compared with 554 in the week before. At this level, the value of sales was nine per cent above that in the comparable week of the preceding year. The total reported since the beginning of 1950 was five per cent more than the corresponding sum in 1949.

Production of bituminous coal and lignite in the same period is estimated at 11,686,000 net tons, 266,000 more than output in the week before and 2,634,000 more than the comparable amount a year earlier.

Civil engineering construction volume reported for the four-day week ended Dec. 28, according to *Engineering News-Record*, was $111.2 million, as compared with $692.0 million in the preceding week. The total recorded since the beginning of 1950, at $12.4 billion, is 51 per cent more than that in the corresponding period of 1949.

Production of electric power rose moderately during the week ended Dec. 23. At 7033 million kilowatt-hours, total output was 17.3 per cent above the amount a year earlier, as compared with an advance of 16.5 per cent shown in the preceding week.

Railway freight loadings in the week ended Dec. 16 totaled 772,902 cars, 0.8 per cent more than the figure for the week before and 20.8 per cent more than the corresponding number in 1949.

Crude oil output in the week ended Dec. 24 averaged 5,763,310 barrels daily, 39,990 more than in the preceding week and 767,860 above production for the similar period in 1949.

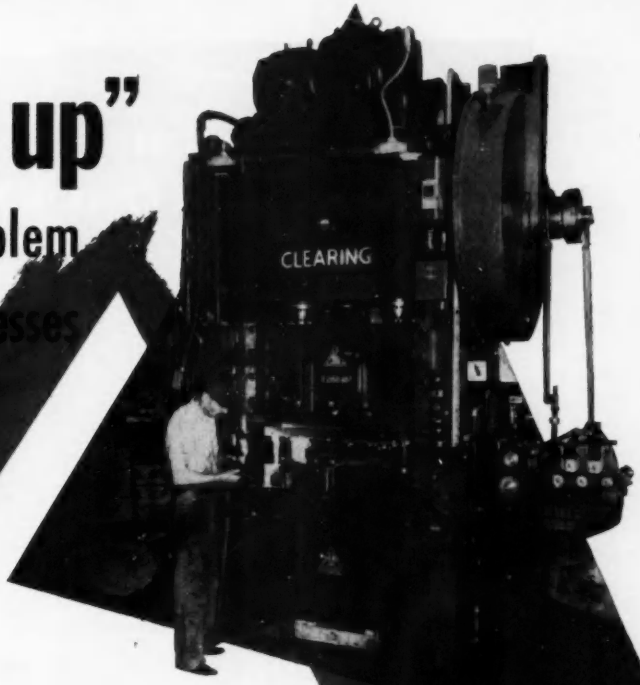
The wholesale price index of the Bureau of Labor Statistics for the week ended Dec. 19, at the new record level of 174.7 per cent of the 1926 average, was six per cent higher than in the preceding week and 15.5 per cent above the comparable figure for 1949.

Member-bank reserve balances decreased $242 million during the week ended Dec. 27. Underlying changes thus reflected include decreases of $144 million in Reserve-bank credit, $13 million in money in circulation, and $1 million in the monetary gold stock. Increases of $101 million in Treasury deposits with Reserve banks, $7 million in nonmember bank deposits and other Federal Reserve accounts, and $4 million in Treasury cash were also reported.

Total loans and investments of reporting member banks increased $1079 million during the week ended Dec. 20. An advance of $340 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at $17,801 million, were $3937 million more than the comparable sum a year earlier.

"Mopping up"

a production problem with CLEARING presses



O-Cedar Corp'n, Chicago, recently introduced a new type of floor mop which has made a big hit with American housewives. A quartet of Clearing presses is turning out the several stamped parts required in an uninterrupted production stream. Two of the presses are fed automatically from coiled strip stock and progressive dies result in a finished stamping at every stroke.

To produce their modern mops, O-Cedar chose modern Clearing presses for their precision and dependability. If you have, or are expecting, a mass production requirement of large or small parts, it will pay you to consult Clearing.

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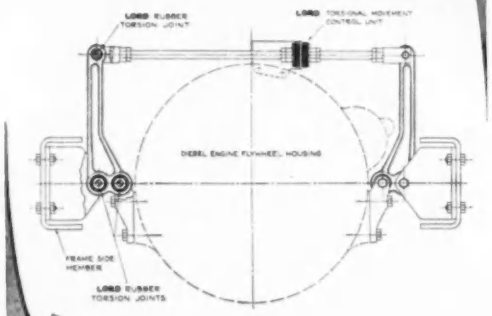
LORD RUBBER TORSION JOINT
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Here is an entirely new type of mounting system developed by LORD to meet the specific requirements of truck and bus manufacturers for smoother diesel engine performance. You need not accept our word for the quality of results. An engine manufacturer calls it "as smooth as a passenger car;" and a bus manufacturer describes it as "the smoothest Diesel installation in the country."

LORD Diesel Engine Mounts provide maximum torsional softness without excessive engine movement. Rubber bushings at all bearing points prevent transmission of noise . . . accommodate manufacturing tolerances of alignment . . . and eliminate need for lubrication. Vertical and horizontal natural frequencies are placed outside the range of road and frame frequencies. LORD Diesel Engine Mounts are easily adapted to existing frame and engine designs. Assembly cost is no higher than that of conventional types of engine mounting.

Engine, truck, and bus manufacturers are invited to write for a copy of Engineering Report No. 237 which describes the construction and operation of LORD Diesel Engine Mountings. Address your request to Product and Sales Engineering Department.

LORD MANUFACTURING COMPANY • ERIE, PA.
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LORD BONDED RUBBER — *Vibration-Control Mountings . . . Bonded-Rubber Parts*

Hot Lacquer Spray Problems

(*Continued from page* 48)

ing agent which evaporate and become a complete loss. Furthermore, in spraying it is not uncommon to have 50 per cent of the sprayed mixture lost due to overspray. Therefore, we had to mix and spray five lb of material to deposit ½ lb of solids on the product surface. Four and one-half lb were completely wasted, plus the labor required to spray them. With hot spraying, the loss can be reduced approximately by half. Lacquer is generally heated to a fairly high temperature (160F) at which its viscosity is reduced to approximately one-fourth of what it was in the cold state. It then only requires from two to two and a half lb of solvents to carry one lb of solids. A three gallon mixture has the same solid content and covers the same surface area that a five gallon cold spray mixture does. Because the heated lacquer is easier to atomize, the spray gun can handle a somewhat greater volume of lacquer per second of trigger action. For these reasons, there is a distinct possibility of conspicuous savings in labor required to spray a given number of pieces with a given film thickness. In actual practice, the output in the spray booth is doubled in a majority of cases. Furthermore, when the sprayers adjust their spray technique for hot spraying, the paint loss due to overspray is considerably reduced.

Aside from the fact that heating lacquer lowers its viscosity, there is another important physical action to consider. The ratio of solvent lost in the process of atomization is greatly increased. In cold spraying, approximately twenty per cent of the solvents in the lacquer that is being sprayed is driven off in atomization. The amount varies according to the distance the gun is held from the surface, the air pressure, the humidity in the air, etc., but in any event the lacquer deposited on the product surface has a higher solids to solvent ratio than when it left the gun. When the lacquer is heated to 160F, the solvents are near their boiling point, and therefore a much greater percentage of solvents are lost in atomization—as much as 60 per cent or more. This is very desirable, provided the remaining solvents carry the burden of sufficient flow and leveling action. This enables spraying a much greater film thickness on a surface before reaching the sag point. By hot spraying lacquer, the finisher can duplicate the build and spray performance of other finishes quite readily. One handling, one trip through the spray booth, will accomplish in many cases that which normally requires two separate spray operations. Extra handling and spraying time are eliminated

(*Turn to page* 118, *please*)

PERMITE
ALUMINUM
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DESIGNED FOR
PEAK
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Engines in many of today's leading cars, trucks and buses run cooler, develop more power, use less gas and oil, because they are equipped with Permite Aluminum Alloy Pistons.
Since the early days of the automotive industry, Permite engineers have worked closely with the engineers of automotive manufacturers in developing pistons to meet the constantly advancing standards of engine performance.
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ALUMINUM INDUSTRIES, INC.
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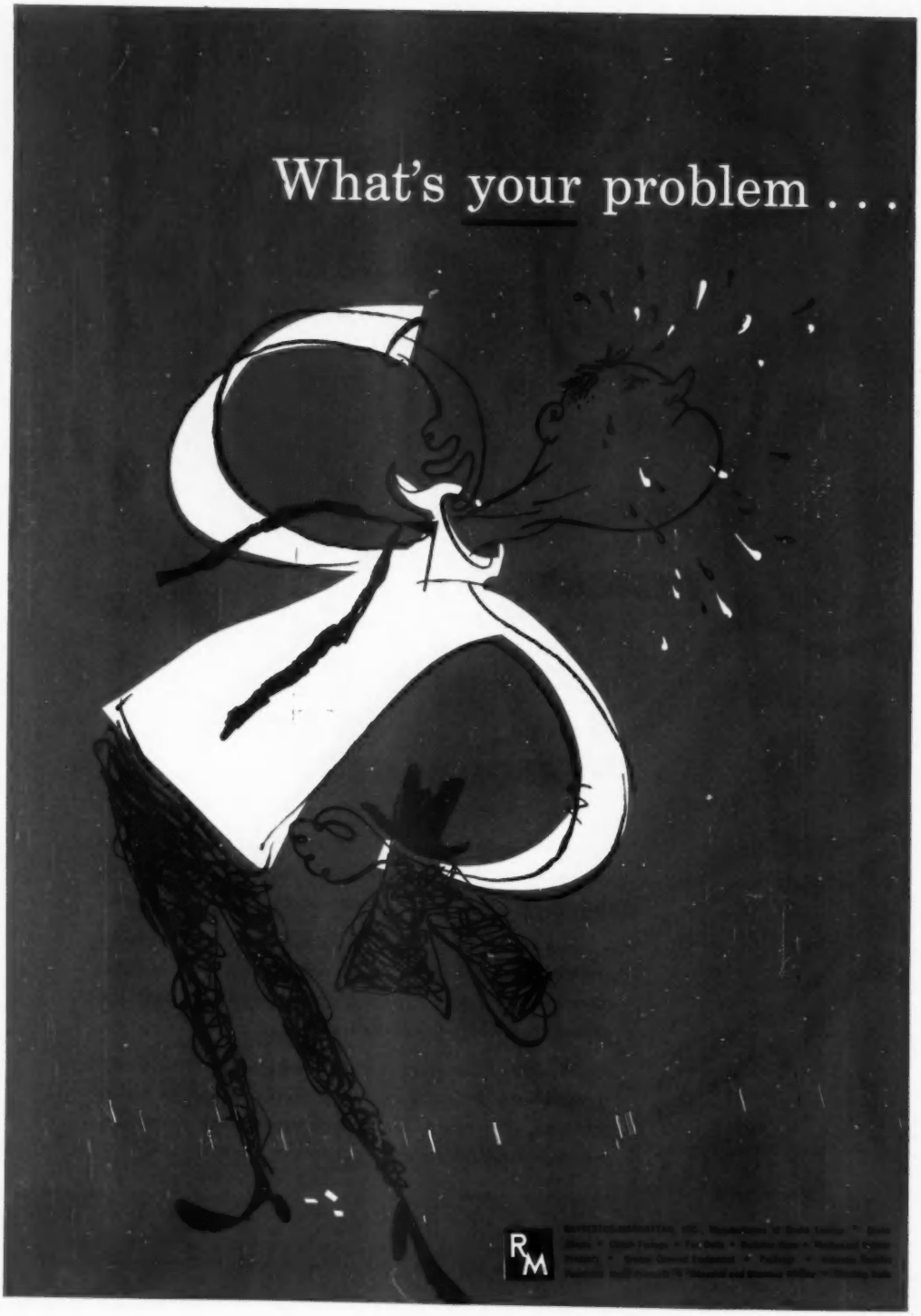
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R/M also produces friction materials that successfully overcome such operating problems as low temperature, heavy moisture, immersion in oil and grease, noise and "grab." And they're ready to help you with any problems on friction materials for automatic transmissions.

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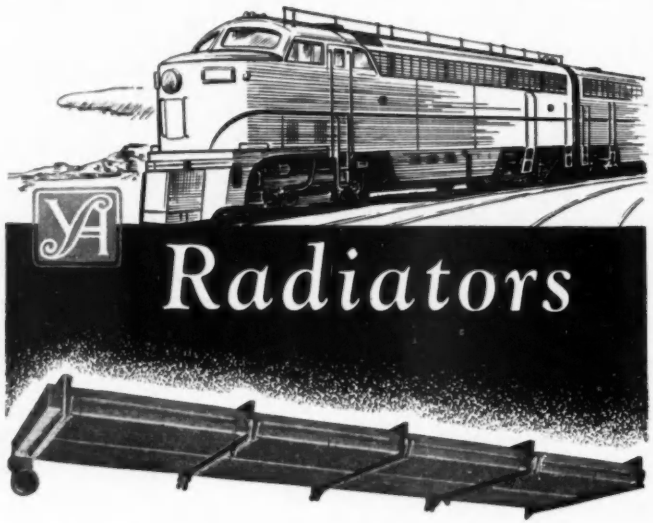
along with the savings in solvents and overspray.

The hot spray process increases the utility of lacquers. Lacquer as a finish has some marvelous qualities. Of special interest to the consumer is the fact that it gives a hard, durable finish of lasting beauty. In the factory it is easy to apply and easy to touch up and repair, for it dries before dust and dirt can settle. Unfortunately lacquer has one drawback—its high cost of application, caused by the need for large amounts of solvents to reduce it to spraying viscosity, and the necessity for applying multiple coats to obtain adequate film thicknesses. With the hot spray process this objection is eliminated, resulting in less material cost and greater labor productivity. In a majority of cases, multiple coats can be eliminated.

There are further benefits to be derived from the hot spray process other than to increase build and solid content. One is the reduction of overspray by taking advantage of heat as a viscosity reducing agent and spraying with the lowest possible atomizing air pressure. On many occasions, atomizing air pressure has been reduced to one-half or one-third of that used for cold spray, resulting in a minimum of paint loss due to the atomized particles being blown past the object being sprayed. It is also possible to obtain a finish with greater depth and better flow out, which requires less sanding and polishing. Metal imperfections can be covered better because there is less shrinkage to the hot sprayed lacquer film. That annoying seasonal problem, blushing, is eliminated without special retarders.

An additional benefit from the hot spray process is a more durable finish for wood finishing than is practical with cold spray. It is possible to incorporate in the lacquer formula higher viscosity nitrocellulose which has definitely been established as having superior cold check test properties than those of lower viscosity. The use of these high viscosity types of nitrocellulose in cold formulations presents an objection—the solid content is very low and too many coats are required to accomplish a sufficient film thickness. When this high viscosity lacquer is heated to 160F, a viscosity at the spray gun is achieved which closely approximates that which would normally be obtained with cold lacquers containing an equal amount of solids. When this is done, savings in labor and material are sacrificed in order to achieve a pronounced improvement in the strength and durability of the lacquer film.

As is to be expected, there are some who have recently tried hot spraying of lacquer and found it impractical. It is erroneous to assume that hot spraying is an automatic success. To properly adopt it, three basic steps should be considered and each step must be carried out thoroughly. Step number one is a lacquer formulated for hot spray and adjusted to the proper consistency with the right type of solvents. Second, the right type of paint heater should be selected and properly installed. Third, the finisher must approach the hot spray process with an open mind and be prepared to adjust his spray technique correctly to take advantage of the process. This last point is probably the most important for the finisher to observe. Spraying hot material requires a special technique which should be mastered by the spray operator before attempting production spraying. There are two systems for adopting the hot spray process. One is to make the transition to high temperatures immediately. The second is to approach it gradually. If the first method poses too many complications, it is advisable to start at a modest temperature setting; such as 110F, and increase the temperature settings in five-deg stages, each time making compensating adjustments in viscosities and atomization pressures. In this manner, the operators have a chance to adjust themselves gradually to the new process. We now have good hot lacquers, we have good hot spray units. There remains the problem of finishers in general being properly acquainted with hot spray technique.



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Aircraft Industry Must Outdo Itself

(*Continued from page* 40)

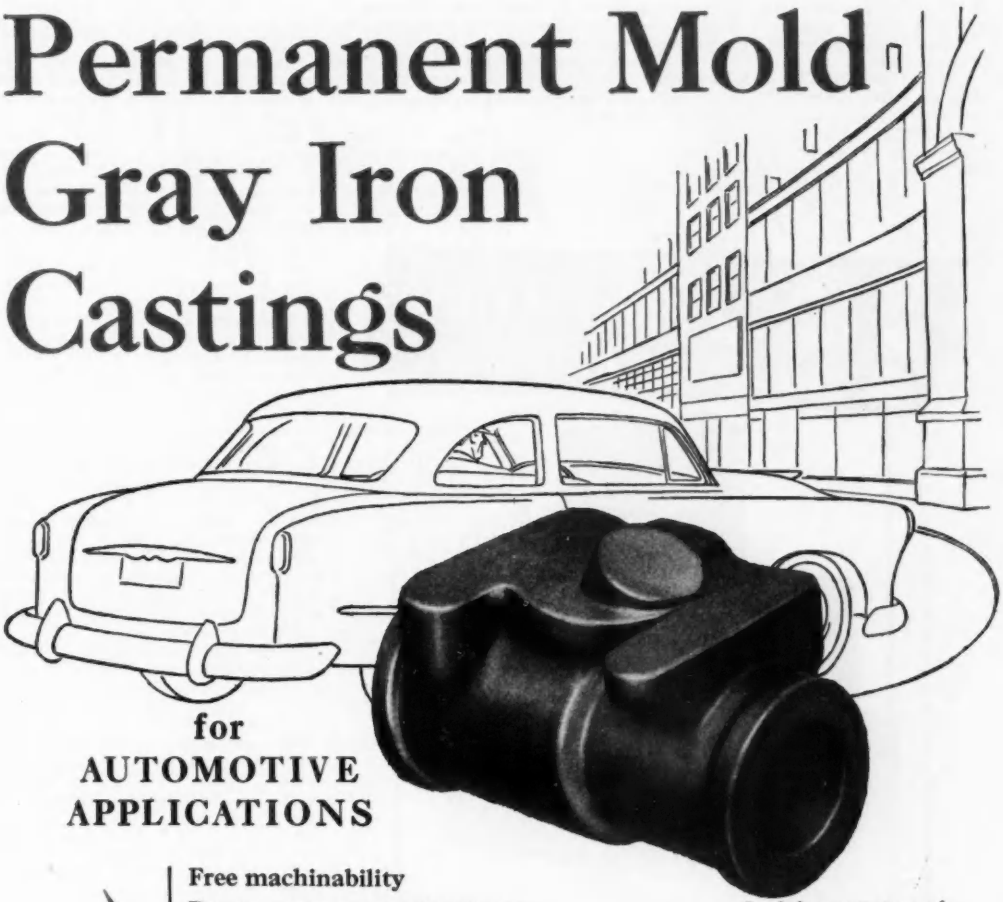
well-known restrictions on the minimum wages and maximum hours of employes. The armed services presently refuse to pay the increased costs of overtime work and are, instead, seeking an increase in the work-week (without overtime) to the 48-hour level typical in World War II. This, of course, should prove difficult if not impossible of attainment in the face of labor union strength with the result inevitable that the higher costs of overtime must be met and aircraft production costs increased even further. Under the present partial (and, therefore, erratic) mobilization, many materials are controlled but many, many more are not. The aircraft industry cannot achieve its maximum rate of expansion without complete Government cooperation in the provision of scarce materials, expeditious placing of production contracts, recruitment of skilled labor and other such control measures, yet such measures are still well in the future.

The increased complexity of modern aircraft is reflected in the enormous increase in the proportion of engineers to shop workers. This has doubled and tripled in the past three years. For example, North American employed 3,035 engineers in all its plants at the peak of World War II but is currently employing 4,377 in its plants and is hiring more daily. World War II total employment was about 75,000, compared to about 25,000 in all North American plants today—and this is typical throughout the industry. The draft has not yet made serious inroads on engineering staffs and few personnel managers protest strongly to draft boards since their petitions are habitually being turned down anyway. Few engineers 26-year-old or under have attained responsible technical positions in the major airframe companies but their services as detailers and changers are sorely needed nevertheless. If the draft age goes to 30 the problem will become more serious and if it ever moves to 35 the situation will be absolutely critical, since aeronautical engineering, by engineering education standards, is still a very new field, despite its 20-year-history.

More serious competitor for engineering talent is the rapidly-rising sub-contract and supplier industry, which currently produces about 60 per cent of the dollar-value of military aircraft production. Its contribution to the airframe industry is generally an expensive, small package (such as accessories, electronic equipment, complex forgings, etc.) which means a greater portion of its product selling costs are in the engineering and tech-

(*Turn to page* 122, *please*)

Eaton Permanent Mold Gray Iron Castings



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- Free machinability
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- Uniform structure throughout the casting
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- Machines to high, mirror-like finish
- Properly annealed; no growth or distortion after machining

Send for your copy of the illustrated booklet, "A Quick Picture of the Eaton Permanent Mold Process for Producing Gray Iron Castings."

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nical development phases and, therefore, salaries in these departments can be higher. For this reason, airframe engineers have learned that there is more money available at the subcontractor's engineering department than in the airframe engineering department and this flow of engineers from the airframe to subcontracting industry is causing concern.

The Air Force is being more realistic than the White House in its expansion program. It plans only a doubling of its strength in its future program. There were 48 Air Force groups in service when the war in Korea began and it is planned to increase this to 84 groups by next July 1. This total will be increased to 100 groups as soon thereafter as possible and the over-all goal is 200 groups by July 1, 1953, or a rough rate of double each year. The Air Force has already re-opened 25 wartime air bases since the war in Korea began and the immediate personnel program calls for doubling the 412,000-man Air Force size at that time by next July. The eventual 200-group Air Force plan calls for about 1½ million men.

The remainder of the aircraft production expansion is earmarked for Europe but this program remains vague at this time. Considerable planning has been advanced on the licensing of U. S. aircraft construction abroad, not only in England and France but in Italy as well. Primary European requirement is for all-weather and interceptor fighters as a part of their general defense problem, the bomber program being entirely a U. S. home-grown product.

England is expanding production on its own crop of jet fighters and is not in need of U. S. fighter production, although some high-level Royal Air Force interest is being shown in the North American F-86 Sabre, a type not wholly duplicated in England. A step has already been made in this general direction by licensed construction of the airplane in Canada, using a Canadian jet engine. France is currently building the DeHavilland Vampire jet interceptor under license as well as its own Dassault MD-450 Ouragan jet fighter but its production facilities as well as accessory supply industry are in no shape to handle large-volume aircraft production. Italy, of course, builds no combat airplanes and its aircraft industry has undergone severe economic upheaval and nationalization since V-J Day that has destroyed large segments of its capacity. There is still argument as to whether to build U. S. fighters here and ship them over, whether to license their construction abroad, whether to advance money for the construction of native combat aircraft or to permit MDAP nations to place orders in the U. S. with the U. S. funds provided under the program.

The aircraft manufacturing industry made substantial gains in its production during 1950. A 12 per cent drop in civil aircraft production reflected the quick drop in personal aircraft production and sales following the Korean outbreak, which came on top of the general decrease in personal aircraft production that has continued since 1946. Commercial transport production held up very well and despite the supposed threat of gas turbine transport competition, backlogs for piston-engine transports are larger today than at any time in the past three years. Douglas has $83 million in orders for commercial DC-6 transports plus an additional $40 million in military orders for the same airplane. These include 80 DC-6 transports for 15 different airlines, 18 for the USAF, 11 for the Navy and six being built without current customers. Lockheed's sleek Constellation also is in demand to the tune of $58 million in orders, including 46 for seven different airlines, 10 for the USAF and 11 for the Navy. Glenn L. Martin's 4-O-4 twin-engine transport is on order by two airlines, a total of 76 airplanes valued at $38 million. A military cargo version is presently being shown the services.

Biggest gain, of course, was in military aircraft production, which was

(*Turn to page 124, please*)

Cut COSTS!
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THREE STEPPING STONES TO A FIRM POSITION IN A COMPETITIVE MARKET . . . The above equipment—designed to specifications laid down by metallurgical engineers in the automotive industry—is also engineered for universal applications and continual tooling changes due to parts revisions from one year's model to the next.

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REEVE semi-automatic Induction Hardening equipment is used by many progressive automotive parts and equipment manufacturers. It is available in several sizes and many flexible arrangements to handle any possible job.

Equipment is also available for soldering, brazing, drawing, annealing, and any other process where metals must be heated accurately and in production quantities. It will pay you to investigate. Write, call or wire.

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HERE... try ESNA's new idea in fasteners ...Rollpins

For a new idea in fastening—for brand-new fastener economies—it's important to you to try Rollpins, ESNA's new self-locking fasteners.

One test application will show you how Rollpins can cut machining costs and assembly time on many types of fastening jobs. In fact, no reaming, no threading, no peening, no keying is required when you use Rollpins, because Rollpins give a vibration-proof fit in *standard drilled holes*. To fasten two pieces of metal—or to fasten a number of laminations—just drill holes within normal tolerances in each piece, press or hammer a Rollpin in place, and the job is done. Rollpins fit flush, can be removed with a drift or pin punch.

Many production lines are now using Rollpins on applications like these:

- as locating dowels on machine housings
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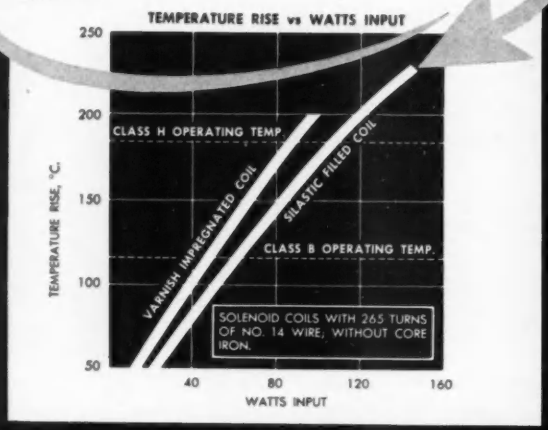
SILASTIC* the resilient dielectric, stable from -60° to +200°C.



dissipates heat much faster than conventional insulating materials

Here's an insulating material that gives you all of the advantages of a rubberlike dielectric at Class H temperatures, plus extreme low temperature flexibility, plus about twice the thermal conductivity of conventional resinous or rubbery dielectrics! In a solenoid coil, for example (see graph above), Silastic gives 15% more capacity than resinous silicone insulation at 180°C. That's due to increased thermal conductivity alone.

Thermal stability plus high heat conductivity permit the Silastic coil to operate at 166% of the maximum capacity for an identical organic resin impregnated solenoid. Performance of over 1600 Silastic insulated main and interpole field coils in diesel-electric traction motors is further proof of the extraordinary advantages of Silastic as a dielectric.

In coils of all kinds, Silastic provides resiliency and relatively constant dielectric properties at temperatures ranging from below -60° to above 200°C., maximum resistance to corona, to electrical and mechanical fatigue and to abrasion, oil and outdoor weathering.

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Silastic insulated solenoid has 166% of the capacity of identical Class B coil plus maximum shock, abrasion and vibration resistance over a span of 260 Centrigrade degrees from —60 to +200°C.

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up a resounding 25 per cent over 1949. The year started off with increased orders for current types and after the June outbreak in Korea these orders have been doubled and redoubled. The production rate has already shown substantial increases since the start of the year. Prior to Korea the output was about 110 planes a month. This rose to 150 a month after the placing of post-Korean orders by the services and production is currently running at about 250 planes a month, a doubling of production in one year without controls of any kind.

Employment rose quite slowly during the year, reflecting the industry's insistence on skilled workers in their hiring. The rate increased towards the close of the year and current employment in the airframe and engine industry is more than one-quarter million. This should be doubled by mid-year and nearly one million employees would be needed in the event of an all-out mobilization announcement.

It is clear that the aircraft manufacturing industry is, once again, being deluged by national demands for its services, following some five years of tenuous existence. This is exactly as constantly predicted by industry leaders, who have long appealed to the government for an orderly program of procurement. Its "feast or famine" existence over the past 20 years has made it a speculative enterprise for the investor and employee alike but so long as its level of activity is geared directly to international tension so long will its character remain unpredictable. For the present, however, and the next five years it would appear that the aircraft manufacturing industry is well into a "feast" period in all respects.

New Buick Bodies

(*Continued from page* 45)

specified. Located in the center of the instrument panel below the radio grille, it can be easily reached and permits setting to any desired temperature range.

Coming to major mechanical features, mention has been made that the 263 engine is now used on all Series 40 and 50 models. This engine has a bhp rating of 128 at 3600 rpm for these models with Dynaflow drive; with maximum torque of 225 lb ft at 2000 rpm. With conventional synchromesh transmission this engine has a rating of 120 bhp for Series 40 with a compression ratio of 6.6 to 1; 124 bhp for Series 50 with a compression ratio of 6.9 to 1. Compression ratio is 7.2 for both 263 and 320 engines with Dynaflow drive.

Hydraulic valve lifters are supplied as standard equipment on the 320 engine and on the 263 for Series 50 models. They are supplied on the 263

(*Turn to page* 126, *please*)

PATTERN FOR PEAK PRODUCTION AT A PROFIT

For Important Reductions in Machining Time...for Accuracy Exceeding Other Production Turning Means...The Monarch Air-Gage Tracer

Look it over! Monarch's 21 years of experience with tracer controls brings you today's Monarch Air-Gage Tracer with every one of these performance features (right). Here is a simple, cost-reducing production method for turning machines. It is recommended for turning multiple diameter shafts and turning, boring or facing contours with a versatility adaptable to a large variety of turning operations. It provides accuracy far exceeding any other lathe duplicating method.

Every Monarch Air-Gage Tracer user knows that these advantages show dollars-and-sense reasons for obsoleting less efficient turning methods—making the change pay off *fast*. You'll know, too, when you examine the complete data in our Bulletin No. 2606. Ask for it—and/or the other Monarch Tracer Control Methods described in the convenient coupon. *The Monarch Machine Tool Co., Sidney, Ohio.*

AIR-GAGE FEATURES

- Imparts a smooth, stepless finish because of the continuous, single tool cut.
- Generally reduces by half the amount of stock left for grinding.
- Often eliminates hand polishing or grinding because of the fine finish imparted to the work.
- Reproduces template form on work more accurately than any other duplicating device.
- Eliminates the need for expensive forming tools and the cost of multiple tool setups.
- Allows a complete setup change in ten to fifteen minutes or less; tool change in one minute or less.
- Permits the machining of practically any combination of diameters, tapers, bevels, forms, grooves, undercuts, shoulders, necks, radii and chamfers in a single continuous cut.

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TURNING MACHINES

FOR A GOOD TURN FASTER...TURN TO MONARCH

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

Gentlemen: Please send without obligation the following complete Bulletins:

- ☐ Bulletin No. 2606—The Monarch Air-Gage Tracer
- ☐ Bulletin No. 2302—The Monarch Motor-Trace
- ☐ Bulletin No. 2401—Monarch-Keller Controls

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CITY _____ ZONE _____ STATE _____

engine for Series 40 only when used with Dynaflow drive.

Sealing and drainage of the starting motor have been improved. Starter field coil insulation is improved by changing from the taped design to a Plastocell coating. A drain slot has been added to the bottom of the starter drive end housing to provide drainage. In addition, the starter shaft is now Parco-Lubrited and dipped in rust-inhibiting oil.

All engines are fitted with a new fan, fan belt, and pulleys, the fan having four blades with rolled tips. Fan and pulleys are interchangeable on all models. Fan to engine speed ratio of 0.9 to 1, formerly used only on Series 70 is standard on all models.

Several engineering changes have been made in the Dynaflow transmission which remains standard equipment on the Series 70; optional on the other series. The low band anchor valve is eliminated and the oil passages in the accumulators and servo body are revised to produce a softer and more uniform engagement of the high clutch. A more pleasing low to drive shift "feel" results, and the endurance life of the high clutch plates and low band is increased.

Cushion springs have been added to the low accumulator assembly and the reverse servo piston to soften the engagement of the low band and reverse band.

Probably the most important change is the design and installation of the new high clutch piston valve. Operation of this valve is entirely separated from the engagement of the high clutch, where it formerly was activated by the engagement.

In the new high clutch piston valve design the ball check valve has been moved to the opposite end of the oil passage and must move up a carefully calculated ramp before it can seal off the passage. Rotation of the piston prevents the ball from moving up the ramp until the pressure of 90 lb is applied behind the piston which seats the ball and moves the piston toward the clutch plates. Seating of the ball check valve now is accomplished by the applied oil pressure preceding any movement of the clutch piston.

Twelve-in. brake drums with lining width of 1¾-in. are used on all but the Series 70, lining width on the latter being 2¼ in. Lining thickness is 3/16 in. on all models.

A major break from tradition is found in the adoption of cemented, segmented linings on the heavier Series 70 models. Segments are of unequal length and consistently longer on the secondary shoe in the interest of equalizing the rate of wear, since the secondary shoe carries a greater share of the work. The length of segments as well as the spacing between them has been developed experimentally to effect lower operating temperatures. The increased number of leading edges provides improved self-cleaning action which is said to prolong lining life and reduce drum scoring. It is also said to be more effective in removing water when brakes are flooded.

While the front tread on all models remains 59.1 in., the rear tread on Series 40 models has been reduced to 59 in., equalizing front and rear tread on these models. The rear tread remains 62.2 in. on Series 50 and 70.

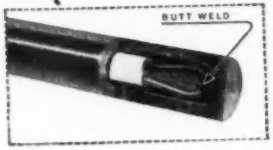
Tires size is 7.60-15 on Series 40 and 50; 8.00-15 on the Series 70. Wheel size is 15-6:00L on Series 40; 15-6.50L on the 50 and 70.

Steering ratio is 19.8 to 1 on Series 40 and 50; 23.6 to 1 on the 70.

Some change has been made in the rear suspension system, distinguishing the Series 40 models from the rest. The rear axle strut rods now are of tubular section of the Series 40 whereas the former channel section strut is retained on the Series 50 and 70. Similarly, the rear spring seat on the Series 40 has been relocated directly over the axle, whereas the former location behind the axle is continued on the 50 and 70.

The Series 40 body models feature rear fenders integral with the rear quarter panel.

"Here's How To Get FASTER TEMPERATURE MEASUREMENT"



In the picture you see Denny Somers, Honeywell Supplies Man of our Philadelphia office, telling a customer all about the new Brown *Fast-Speed Thermocouple* . . . after describing all of the benefits of the HSM Plan for buying pyrometer supplies.

You'll be pleasantly surprised when *you learn* how *the plan* can add convenience and economy to your pyrometer supplies purchasing, too!

There's a Honeywell Supplies Man near you . . . at your local Honeywell office . . . no further away than your phone. Call him in today, and you'll take an easy step in the right direction!

NEW BROWN *Fast-Speed Thermocouple* IS FASTER BECAUSE:

(1) Butt-welding replaces mass of metal at hot junction; (2) Shape of wire adjacent to junction holds back insulator, prevents it from dissipating heat and affecting response of the thermocouple.

Depending upon the application, this *Fast-Speed Thermocouple* is 1½ to 9 times faster than conventional type thermocouples.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*
4548 Wayne Ave., Philadelphia 44, Pa. *Stocks for immediate shipment in Philadelphia, Cleveland, Chicago, Atlanta, Houston, Los Angeles, and San Francisco.*

Honeywell
BROWN INSTRUMENTS

Low cost bushings with HIGH performance

Rolled split-type bronze bushings, produced in large volume in countless varieties, for hundreds of uses, offer you economies for your applications. Rigid quality control in production assures the desired performance standards. Controlled alloy quality and grain structure mean uniformity, strength and free machinability. A thin-wall can be specified in a Federal-Mogul bushing without loss of strength, saving material, time and labor. A great range of lengths and diameters is produced and can include oil holes, formed oil grooves, slots, cut-outs, standard or special seams. For heavy-duty, high precision or intricate shapes we also manufacture a wide variety of cast bushings to almost all bronze specifications. Ask your Federal-Mogul representative, or write:

FEDERAL-MOGUL CORPORATION
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Our six plants produce sleeve bearings in all designs and sizes, cast bronze bushings, rolled split-type bushings, bi-metallic rolled bushings, washers, spacer tubes, precision bronze parts and bronze bars.

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A tip for you on trimming costs—put T-J products to work in your plant! Engineered to *save labor* and give you *plus performance* in a wide range of applications.

For those "muscle jobs" of pushing, pulling or lifting—100 lb. or 50,000 lb.—save money by mechanizing with T-J Air and Hydraulic Cylinders! For high production in rivet-setting, specify T-J Rivitors with automatic feeding and setting . . . air or electric power. For setting clinch nuts in automotive body panels, door locks and other products . . . set 'em 3 to 5 times faster with T-J Clinchors! For more work between grinds in tough die steels . . . T-J Cutters! For accurate, automatic control of presses, brakes, other machines and equipment . . . T-J Air Controls.

That's it—get T-J *all the way* for tough jobs! Send for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

T-J 34 YEARS EXPERIENCE

TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

Publications Available

(*Continued from page 60*)

of the production possibilities with air power. Not only is the firm's equipment described in detail, but specifications, cutaway drawings and actual production case histories are provided.

A-21 High-Temperature Alloys

Union Carbide and Carbon Corp.—Two new cobalt-base alloys are described in a completely revised and up-to-the-minute edition of the booklet, "Haynes Alloys for High-Temperature Service," that has just been published. The booklet contains 96 pages of technical data on 10 alloys that were especially developed to meet the exacting demands of service at elevated operating temperatures.

A-22 Set Screws

Set Screw & Manufacturing Co.—A new demonstrator of the Zip-Grip self-locking set screw is now available. It shows how the new set screw obtains self-locking action.

Machining and Hardening

(*Continued from page 50*)

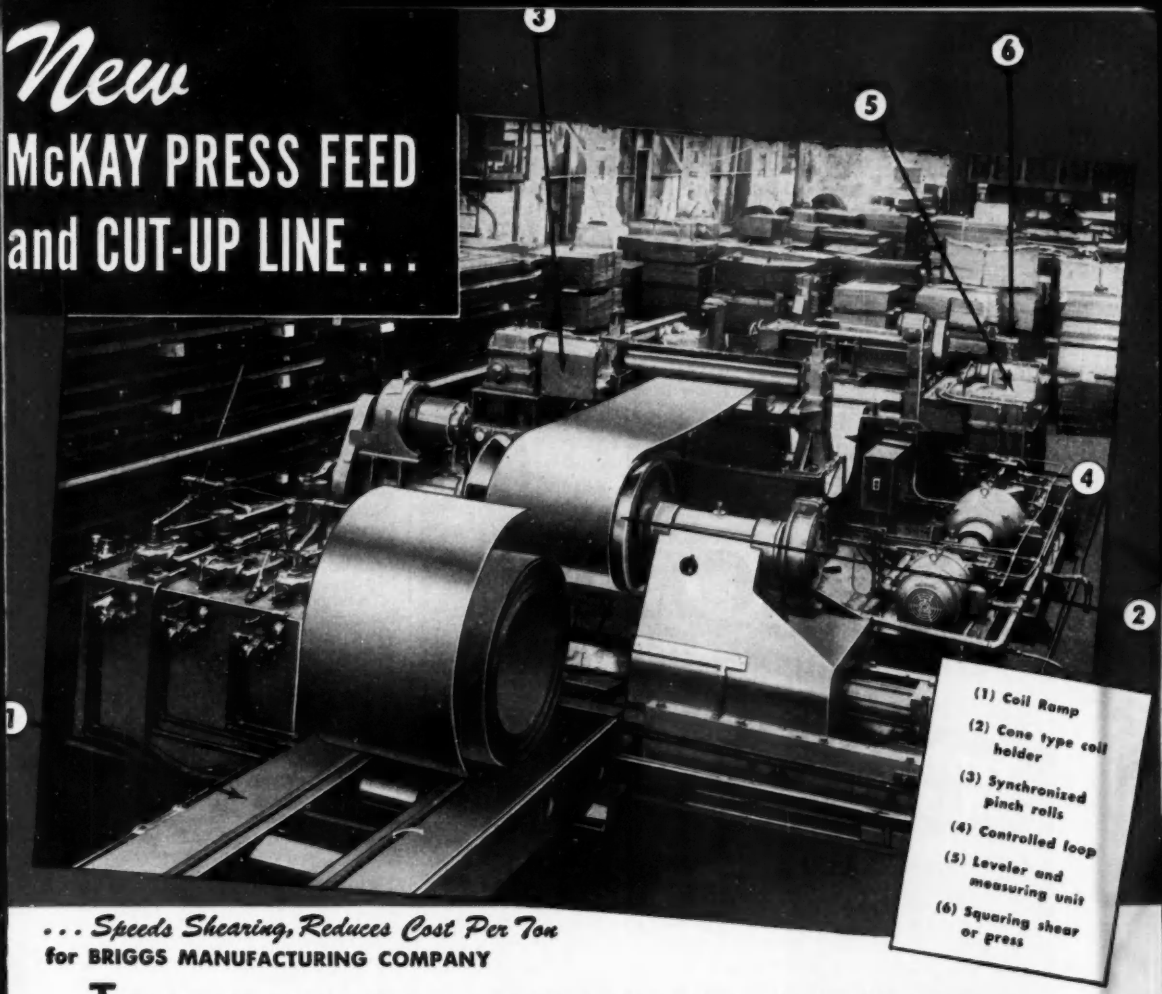
The induction hardening equipment is mounted on a gallery directly over the Conomatics, each unit serving two machines. Each of the induction hardening units operates at a frequency of 450 kc. Hardening is done at the seventh position. The solution for the requirement of a controlled hardening pattern and suitable hardness range was found in the development of the special hardening attachment which includes a tiny oil-cooled coil fitting within the bore of the work. The work is oil-quenched, the quenching being initiated at the instant the part has begun to heat up.

Several machines have been tooled as described and are in experimental production at the present time to permit changes and modifications in tooling, speeds and feeds, and other important variables. This technique has been employed by Ford in the making of other selected parts so that no difficulty is expected with this operation.

American Brake Shoe Co., Kellogg Div.—**Fred L. Cogswell** has been appointed sales manager.

Lipe-Rollway Corp.—**A. Alven** was appointed general sales manager in charge of all sales including machine tools, bar feed, hacksaw and clutch sales.

New McKAY PRESS FEED and CUT-UP LINE...


(1) Coil Ramp
(2) Cone type coil holder
(3) Synchronized pinch rolls
(4) Controlled loop
(5) Leveler and measuring unit
(6) Squaring shear or press

... *Speeds Shearing, Reduces Cost Per Ton* for BRIGGS MANUFACTURING COMPANY

THE Briggs Manufacturing Company, one of the leading producers of automobile bodies and plumbing fixtures, has recently installed a 48" wide McKay press feed line to speed coil shearing at its new Youngstown, Ohio, plant.

On one production run, Briggs sheared 215 tons of 36" wide, 48" long, 14 gage sheets from coil, in 16 hours operation. On another occasion 17,000 cuts were made on a two shift basis. Although these production figures do not represent the absolute capacity of this line, they do indicate the dependability and ruggedness of McKay equipment.

The installation illustrated above utilizes hydraulic drives and hydraulic control equipment. Similar lines using electrical drives and electrical control are available.

All equipment illustrated above is applicable to a press feed line merely by substituting a press in place of a shear.

Consult McKay engineers if you have a press or shear feeding problem.

THE McKAY MACHINE COMPANY

Engineers and Manufacturers of Sheet, Tin, and Strip Mill Equipment

YOUNGSTOWN, OHIO

MORE MACHINE

McKAY

FOR YOUR MONEY

AIRBRIEFS

(*Continued from page* 54)

for subcontract work. Thus, the aircraft manufacturing industry will actually receive roughly about one billion of this six billion appropriation.

Vision Ahead

Undersecretary of Air Force John McCone, whose Bechtal-McCone Co. has had vast experience in heavy construction throughout the world, is showing commendable foresight in his personal handling of the current aircraft production expansion program. In his renovation and tooling of surplus plants for a restoration of their World War II aircraft production, he is preparing them for a capacity at least twice that of current orders. This means, literally, that he is installing surplus capacity into each of these plants as of the day they start operation. This is an expensive and time-taking policy and he is spending $550 million on the job, but he is saving much more than this amount by this policy because eventual doubling of current production programs seems a probability at this moment. This means a smooth, economical expansion when the call for more production comes. It's a rare instance of real foresight by a Government spender and the kind of sound thinking that alone can prevent wrecking our economy by war expansion in the future.

Buy British?

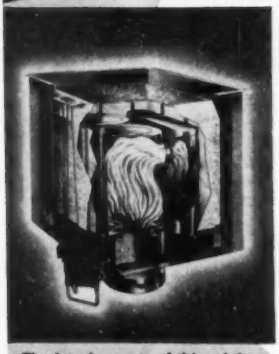
The U. S. Armed Services are showing an unhistoric interest in British aeronautical equipment these days, an interest that seems to have mounted in the past few years. It began in seriousness with the procurement of the British Rolls-Royce Nene turbojet engine produced by the Pratt & Whitney Aircraft Division, United Aircraft Corp. This was followed by the Rolls-Royce Tay turbojet engine by the same company, both engines being in quantity production for the Navy Bureau of Aeronautics. We mentioned above the Armstrong-Siddeley Sapphire turbojet engine now in production by Curtiss-Wright Corp. The entry of British airplanes now seems imminent. The recent Air Force trainer competition at Randolph AFB, Texas, was attended by the British Avro Athena trainer. The current liaison aircraft competition at Wright-Patterson AFB, Ohio, features the Canadian DeHavilland Beaver light transport. Wright Field Pilots are currently giving the Canadian Avro CF-100 two-seat, all-weather fighter a comprehensive evaluation program.

Now come indications that the Air Force considers the English Electric Co. Canberra light jet bomber, a type the British have ordered into vast quantity production, as a competitor for light bomber honors at Wright Field. We hate to sound like Col. McCormick, but all of these things indicate a growing trend in somebody's thinking in the Defense Department. Lord Tedder, in a recent Washington speech, suggested that the U. S. might build a British airplane or two "in the interest of our mutual rearmament effort." We don't know just what this means, other than the fact that it would be "a good thing," as the British so often sum things up. We believe fervently that the U. S. aircraft industry can out-design and out-produce any other nation in the world and that, therefore, we need no assistance whatever from any nation on earth in these things.

Dexterous double-talk can make, and has made, quite a case for interchange of military equipment between the fighting forces of two nations and "joint cooperation" has become almost a way of life in matters military in the past few years. But we don't see the slightest connection between these considerations and any necessity for the

(*Turn to page* 132, *please*)

Sicon Formerly MICO
Silicone-Base High Heat-Resistant Finish
PROTECTS THIS PRODUCT AGAINST TEMPERATURES OF 870° (F.)



The interior parts of this miniature inferno are SICON-coated.

☆ It takes an unusual finish to withstand the constant high heat generated by the combustion chamber of the Superflame Floor Furnace, made by the Queen Stove Works, Inc. Yes, SICON lengthens the life of this unit because it does not break down like ordinary finishes due to its amazing stability under high heat. SICON is the first commercially priced silicone base finish that can be applied by brush, spray or dip and which either air dries or adapts itself to any existing force drying system.

Write for data.

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Waukegan, Ill.
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OVER-THE-ROAD TRUCKERS
Depend on Wagner Air Brakes

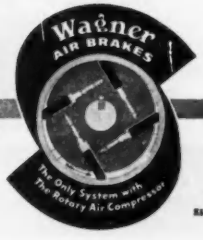
"FOR FREEDOM FROM MAINTENANCE... FOR ALL AROUND DEPENDABILITY...."
WESTERN TRUCKING CO.
Wagner Air Brakes
ARE OUR BEST BUY"
OUR FLEET OF Heavy-Duty Asphalt Haulers REALLY GETS "A Going Over"
"We Made the RIGHT Choice When We Selected Wagner Air Brakes"
Wagner Electric Corporation
ONE OF THE FEATURES THAT SOLD US Wagner Air Brakes IS THE Rotary Air Compressor
FOR BRAKE SERVICE REMEMBER ...Wagner Air Brakes are YOUR BEST BUY
Wagner Electric Corporation

Because of their dependability and exceptional brake economies Wagner Air Brakes have won favor with over-the-road truckers everywhere. Thousands of trucks, tractors, trailers and buses equipped with these widely accepted air brakes are establishing outstanding records for safety and low brake maintenance.

The Rotary Air Compressor . . . Power Cluster and other exclusive features are just a few of the reasons why Wagner Air Brakes are nationally recognized as the *"best buy."*

It will pay you to include Wagner Air Brakes as original equipment. Get the facts. Write for your copy of bulletin KU-201.

Wagner Air Brake Users are our Biggest Boosters



Wagner Electric Corporation

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(Branches in Principal Cities and in Canada)

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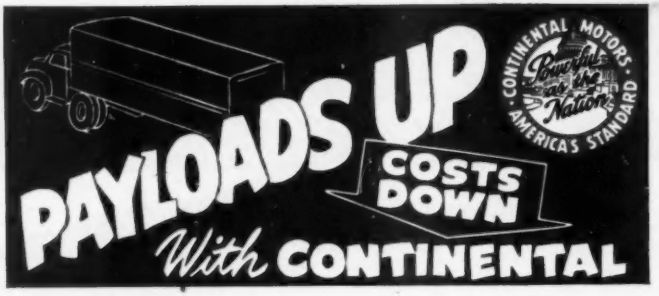
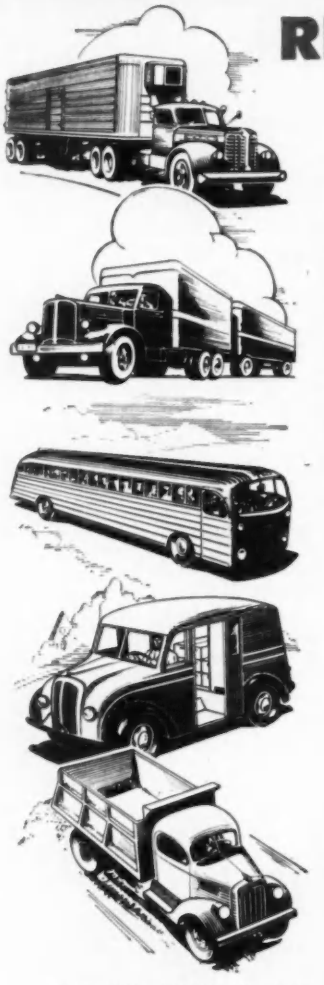




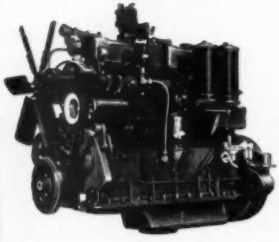
RED SEAL POWER

The increasing use of Continental Red Seal engines in specialized commercial vehicles of all kinds can be traced to a steadily-growing recognition of one fact: *Continental power delivers the goods for less.*

Continental power is completely specialized power. Whether the application be truck, tractor, bus, door-to-door fleet unit or what not, its power plant—if Continental—is engineered expressly for the requirements of its work. Elimination of compromise on any score whatsoever is reflected in larger payloads, lower maintenance and operating costs.

MODEL R-600 HEAVY-DUTY ENGINE

(transportation) Six-cylinder—overhead valve type—for buses, trucks and tractors. Delivers 110 to 160 net horsepower.

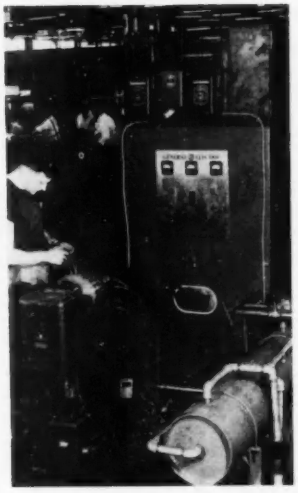


SERVICE EVERYWHERE

Continental Motors Corporation
MUSKEGON, MICHIGAN

interchange of production of such equipment. Pratt & Whitney had to redraw 1100 British drawings on the Nene to insert U. S. dimensions and tolerances, had to redesign the accessory section of the engine for U. S. equipment and specify U. S. screw threads, nuts, bolts, etc., throughout. Finally in production, it hardly seems that the P&W workman gained any experience whatever in the production of a British engine—it was a U. S. engine through-and-through by the time it got to the shop floor. In the case of the Canberra bomber, its ribs are attached to its skin stiffeners by screw-eyes which are inserted, turned 90 deg, and a screw inserted through the eye, assuredly the very first feature of the airplane any U. S. airframe manufacturer would toss out the window (and substitute a simple clip and rivet instead.) U. S. engineers are being badly abused by this mounting "Buy British" interest among aviation procurement officers, and their unmatched talents squandered thereby.

Induction Heater Handles 35,000 Valves per Day



Costs of valve stem tip hardening have been reduced 30 per cent at the Cleveland plant of Thompson Products, Inc., since the installation of a new setup for this process. As illustrated, a 20-kw General Electric induction heater is employed and during the first three months on the production line 35,000 valves per 24-hour day were processed.

AUTOMOTIVE INDUSTRIES
Keeps You Informed

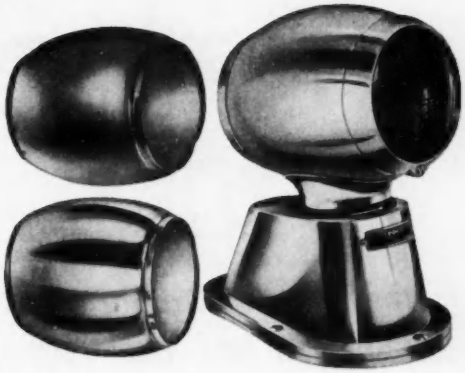
A LESSON IN SAVING—

Production Problem + REV-O-LITE ENGINEERS + REVERE = ELIMINATION OF COSTLY FORMING OPERATIONS, BRAZING AND EXTRA HAND FINISHING, PLUS FASTER PRODUCTION... AND AN IMPROVED PRODUCT

IN the development of their Rev-O-Lite, a revolving warning light for emergency vehicles, the Balford Corporation, Jacksonville, Florida, found themselves faced with a production problem regarding the cylindrical shell which contains the lights. The question was; what would be the most efficient and economical way to produce this shell that measures 6" in length and is 4½" in diameter at the ends? Should it be formed from a metal strip and brazed? Could tube be used and bulged in a die? Or, should some other method be employed?

Revere, working with the design engineers of the Balford Corporation, exchanged ideas, weighed the pros and cons of various methods; experimented. They found that by using 70/30 Revere Brass Tube in a light anneal temper, it would take the bulging in the die satisfactorily and at the same time show up well as far as grain size control was concerned. By this method, complicated and costly forming operations and brazing could be eliminated, production speeded and the shell formed without any unsightly seam. Also, no extra hand finishing would be necessary before plating.

Perhaps one of the many types of Revere Brass or one of the other Revere Metals or Alloys can help you improve *your* product —cut your production costs. Why not tell Revere's Technical Advisory Service about *your* metal problems? Call the Revere Sales Office nearest you today.



UPPER LEFT shows brass shell of the Rev-O-Lite as it comes from the bulging die. Without any extra finishing, which would have been necessary had shell been made of strip and brazed, shell is chrome plated as shown at lower left. At right is the completed assembly of the Rev-O-Lite ready for action on the roofs of all kinds of emergency vehicles such as police patrol cars, ambulances, fire trucks, etc. Chrome finish base is of cast zinc alloy.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Los Angeles and Riverside, Calif.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere.

Latest in Vehicle Heating

(*Continued from page 37*)

the heater may be controlled by means of dampers to provide for 100 per cent fresh air or 100 per cent recirculated air. It is then possible to use a relatively small heater by increasing the recirculated air when the ambient temperature is extremely low.

In almost all cases the fresh air is obtained by a duct and scoop at the front of the vehicle. The scoop is usually obscured by the radiator grille or front-end sheet metal. Very few modern designs utilize the cowl ventilator at the base of the windshield although there is some indication that this way of introducing fresh air may be revived. As a matter of fact it appears to be superior to the front-end scoop since with the scoop it is possible to introduce obnoxious fumes under heavy traffic conditions.

Location of Equipment

Until recently it was universal practice to mount the heater on the dash in the passenger compartment. Holes in the dash were required for piping and other connections. The trend now is to avoid dash-type mounting, particularly in the very latest cars. Automobile design trends are toward the use of instrument panels which extend out from the dash only a very short distance and blend into the fire-wall and toeboard. With this type of design it is extremely difficult to achieve an attractive, unobtrusive heating installation.

In many modern cars and particularly 1949 and 1950 models, provision has been made for built-in duct systems which makes it almost mandatory to install the heater in some portion of this network. Duct connections from the heating and ventilating unit occupy a great portion of the dash space under the hood which would otherwise be available for the dash-mounted heater.

If the car designers decide that the cowl ventnlating system is superior, then some difficult problems will be presented. Since the cowl ventilator introduces air directly into the passenger space, it would seem reasonable to install the heater in this space rather than in the engine compartment. If the heater is to be installed under the hood and the cowl ventilator is to be used, then the duct system will become complicated. On the other hand, there is no particular reason why the advantages of the cowl ventilator could not be retained and still mount the heater in the engine compartment. The position of the dash, instrument panel, and cowl ventilator could be modified so that the ventilator introduces air directly into the engine compartment and through the heater by means of a sealed duct.

Air Distribution

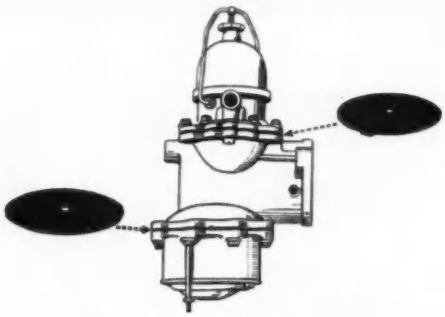
Numerous methods have been used to achieve satisfactory temperature distribution and air circulation within the vehicle. This problem is particularly acute in connection with sedan-type automobiles. Furthermore, it is necessary to introduce the heated air at points in close proximity to the passengers and still avoid excessively cold or hot drafts.

In the older systems, the air was introduced at some point near the dash which in most cases was also the position of the heater. Forced induction of fresh air was not used. With this arrangement it is extremely difficult to provide any reasonable conditions of comfort in the rear seat. Attempts were made, however, to correct this situation by designing heaters which could be mounted under the front seat of the car. Heated air was then discharged to both passenger compartments. An underseat heater is capable of producing excellent conditions for the entire vehicle but is an expensive installation particularly for hot-water-type heaters—long coolant pipes must be installed from the engine to the

(*Turn to page 136, please*)

VULCAN

RUBBER COATED FABRIC



. . . is the Perfect Diaphragm Material

for COMBINATION FUEL AND VACUUM PUMPS

More and more manufacturers are now making these combination units, and more and more are using VULCAN diaphragm material.

When you specify Vulcan Coated Fabrics for fuel pumps and vacuum booster pumps, you get material that is TWO WAYS right in meeting your requirements.

The same material that has such excellent resistance to aromatic gasoline also provides the high tensile and burst strength necessary to operate the vacuum booster pump.

Wherever diaphragms are used in automotive parts, VULCAN offers the right kind of diaphragm fabric for the job. Write for literature.

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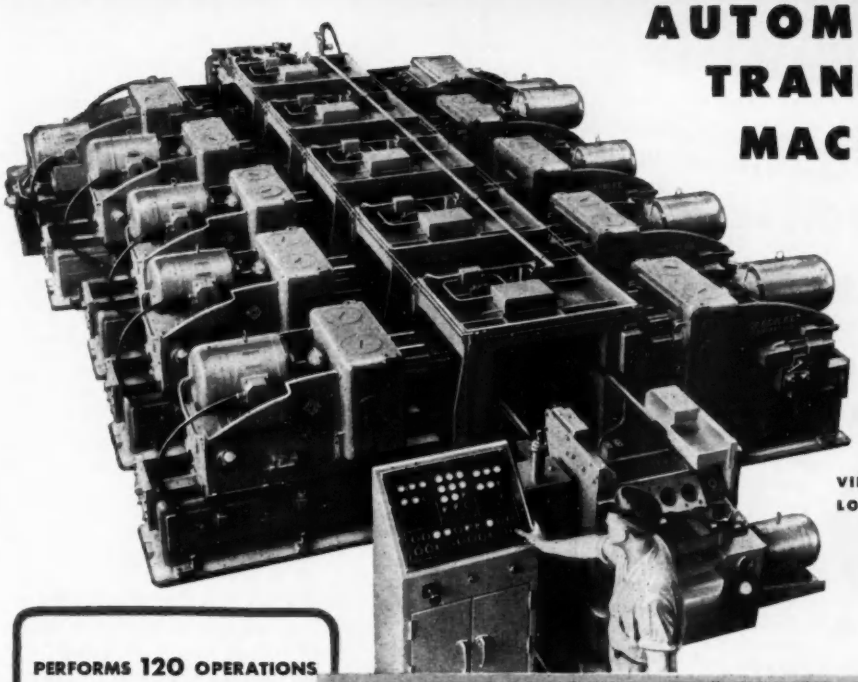
GREENLEE

AUTOMATIC TRANSFER MACHINE



VIEW FROM LOADING END

PERFORMS 120 OPERATIONS

STATION 1
Load and Turn Over 180 Degrees

LEFT HAND UNITS	RIGHT HAND UNITS
STATION 2	
Drill 12 Holes	Drill 14 Holes
Drill & Chamfer 2 Holes	
STATION 3	
Drill 7 Holes	Drill 10 Holes
STATION 4	
Drill 3 Holes	Drill 2 Holes
C'Bore & Chamfer 1 Hole	11" Deep
Ream 2 Holes	
STATION 5	
Drill 4 Holes	Drill 1 Hole
Ream 2 Holes	Ream 2 Holes
Chamfer 11 Holes	Chamfer 18 Holes
STATION 6	
Tap 14 Holes	Tap 17 Holes
STATION 7	
Unload	
58 OPERATIONS	62 OPERATIONS

TOTAL — 120 OPERATIONS

PRODUCTION MACHINERY
GREENLEE

FOR PROCESSING CYLINDER BLOCKS

PRODUCES 45 BLOCKS PER HOUR... AT 80% EFFICIENCY

This 7-station automatic transfer machine performs a total of 120 individual drilling, chamfering, counterboring, reaming, and tapping operations in a continuous cycle on cylinder blocks for a leading automobile manufacturer. The loading end of the machine is equipped with a turnover fixture that revolves the work 180 degrees, eliminating handling of the piece as it is received from previous machining operations.

Greenlee patented precision-ground individual lead screw spindles tap a total of 31 holes in both ends of the cylinder blocks. All tapping units are provided with a rapid approach and return stroke. Automatic tap lubrication insures clean, precision-cut threads with maximum tool life.

The electrically-controlled hydraulic units are easily accessible for set-ups and for making tool changes, and are designed so they can be independently operated. Ample room is provided between stations for work inspection. Automatic lubrication of each vital moving part assures long machine life and efficient operation.

The experience of Greenlee engineers and the skill of Greenlee manufacturing personnel were combined to produce this machine. The effectiveness of this Greenlee team can be used by you, too, toward the licking of *your* production machinery problems.

Additional Information Available Upon Request

GREENLEE BROS. & CO., 1751 Mason Ave., Rockford, Ill.
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MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

TIPS ON MACHINING Stainless Steel for Higher Production AT LOWER COST

Page B-3

AUSTENITIC STAINLESS STEELS (Cont.)

WIDE VARIANCE IN MACHINABILITY

Types such as 303 are considered free-machining 18-8 grades, while various other 18-8 grades such as types 321 and 347 are extremely difficult to machine. These latter types are especially serviceable at elevated temperatures and will be found to be used frequently for aircraft parts, particularly jet engine parts where extremely high heat may be encountered, and high strength is essential.

CUTTING FLUIDS FOR AUSTENITIC STAINLESS STEELS

DATA!

For the machining of all grades of stainless steel the presence of active or effective sulphur in the cutting fluid in varying amounts is vitally important as this quality tends to reduce the work-hardening characteristics and tendency of these materials to pick-up and weld to tool surfaces.

It should be pointed out that the severity of the machine operation has a direct bearing on cutting fluid application. Operations such as tapping, threading and broaching where slower speeds and heavier cuts are usually in evidence, require a cutting fluid high in active sulphur and factors of lubricity.

Generally speaking, however, the free-machining grades of austenitic stainless steel demand a balanced amount of active sulphur while types such as 347 require the maximum possible amount to prevent chip weld and provide smooth finishes.

STUART'S ThredKut 99 FOR STAINLESS

PROOF!

A Wisconsin manufacturer recently tried twelve different heavy duty cutting fluids for the tapping of type 310 stainless steel. One of the oils that failed sold for 45c per pound. Production with the best of these products amounted to 50 holes per tap. With Stuart's THRED-KUT 99, production was increased to 550 holes per tap.

D. A. Stuart Oil Co.

2733 S. Troy Street, Chicago 23, Illinois

heater. There were also service difficulties since an underseat heater is not readily accessible. Moreover there is another very serious disadvantage which has to do with the difficulty of designing a satisfactory defrosting system for the windshield. In some cases the problem was partially solved by utilizing a separate defrosting blower. A heat exchanger of small size was added to the defrosting-blower system in some instances. While the underseat mounting has disadvantages, it certainly has advantages which are worthy of attention. This is particularly true at the present time because of the difficulties of mounting a heater on the dash of a modern car or even under the hood. Perhaps the underseat mounting position may be available to the designer for many years to come because it does not appear to be an area that may be used for other purposes.

As stated previously, it is extremely difficult to provide satisfactory comfort conditions in a passenger car because the warm air must be delivered in close proximity to the passengers. This is particularly true with fresh air systems in which a considerable quantity of air is introduced. If this air is discharged into the passenger compartment at the dash by a duct and small grille, there may be excessive velocity and, therefore, an uncomfortable condition. For this reason many recent designs have rather elaborate distribution plenum chambers and discharge nozzles.

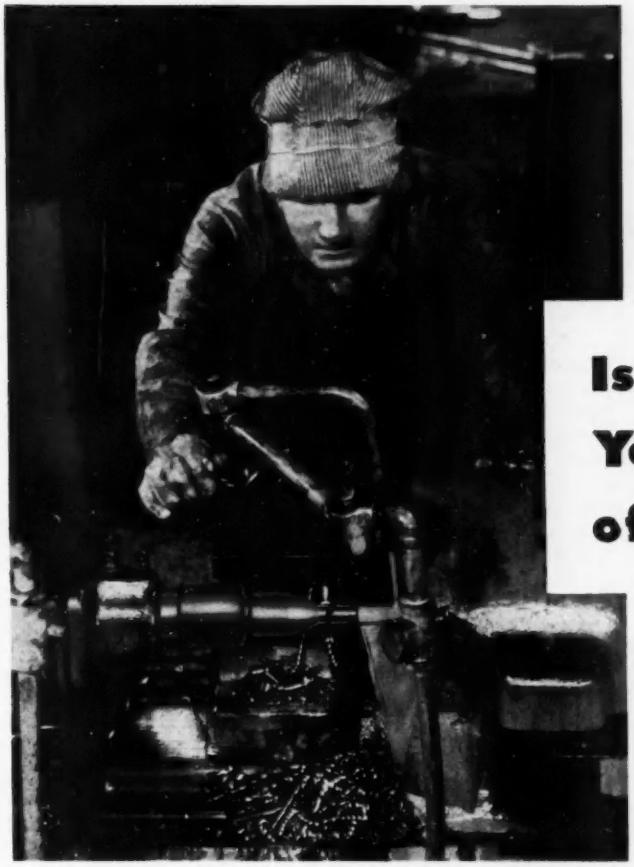
Although the use of a large quantity of fresh air introduces additional problems, this practice tends to provide a more comfortable condition in the rear seat of sedan-type vehicles. Induction of a large quantity of air tends to provide greater turbulence within the automobile and more satisfactory mixing. Since air will be lost by the vehicle through exfiltration around doors and windows, more satisfactory temperature gradients are obtained.

Military Heating

One recent Stewart-Warner development of the combustion type heater is being used by the Army Ordnance Department for various military vehicles. Designed for 100 per cent fresh air ventilation, the heater can be mounted either under the hood, in the passenger compartment, or on some external portion of the vehicle.

Fuel, metered by means of a fuel governor and valve, is ignited by a glow-coil type igniter. It burns in a pocket in a heat exchanger consisting of stainless steel concentric cylinders. Hot gases from the burning fuel are exhausted through a stainless steel tube after they have made two passes through the exchanger. Ventilating air is forced through the heat exchanger by means of a Sirocco type blower. There are numerous safety devices such as a limited-volume safety

(*Turn to page* 138, *please*)



Is Machining Your Method of Inspection?

If you depend on machining to locate hidden defects in parts or material, you pay an exhorbitant price for "inspection"— through wasted labor and machine time. Further, there may be defects "getting by" that can later cost someone plenty in trouble and dollars.

Machining defective materials is a dead loss! Inspection with *Magnaflux is the modern, economical way that locates defects *before* machining. It is fast, non-destructive and *accurate*. If there is a defect Magnaflux locates it — positively, clearly and unmistakably, whether it is a surface or subsurface crack, a forging lap, a tear, or what have you? Inspection on an engineered Magnaflux unit proves cheaper than even visual inspection, as well as more effective.

Magnaflux inspection is a proved way to turn wasteful losses into profitable operations. That is mighty important to you today. Take just a minute or two right now to write for full particulars.

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Here are a few of the industries for which Fairfield supplies fine gears made to order

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valve, flame detector, and overheat switch.

The limited-volume safety valve consists of a spring-loaded diaphragm which forces a measured amount of fuel into the heater for starting only. During this period, the heater must start and actuate a flame-sensitive switch which in turn opens the solenoid valve of the limited-volume safety valve, thus permitting the continued flow of fuel and recharging of the diaphragm compartment.

The flame detector switch is made up of a snap-action switch actuated by a thermo-sensitive element consisting of a stainless steel tube and fused quartz rod. When exposed to flame, the steel tube expands and, because of the substantially zero temperature coefficient of expansion of quartz, there is a movement permitting actuation of the switch. The switch operates within a few seconds after the flame has been established; it extinguishes the igniter and opens the safety valve.

Rapid Riveting

(*Continued from page* 46)

are counterbored to fit over a machined flange of the brake drum. This flange serves to pilot the sprocket and maintain concentricity on the final assembly. The dust ring is a stamping of a relatively thin section.

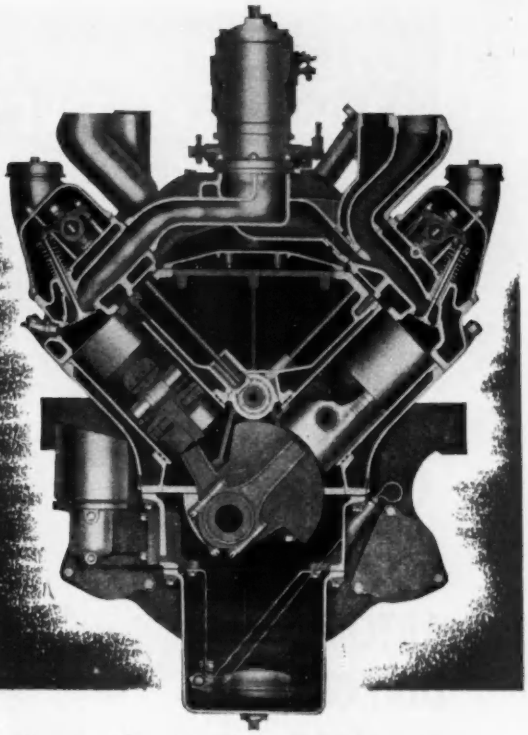
A single downstroke of the ram fastens as many as 18 rivets simultaneously in the wheel-sprocket and brake-hub assemblies. Formerly, it was necessary to secure one rivet at a time at four points to keep the parts aligned for final riveting. The first rivet often caused misalignment of the other holes and kinking of the dust ring. This called for rigid inspection, and straightening was generally necessary. With the 35-ton Denison Multipress now in use, correct alignment is automatic.

Three sets of fixtures are used on the press in assembling the rear wheel brake drum and sprocket. Others are used for assembling wheel hubs and flanges. Two sizes of tooling are required for the clutch hub and drum assembly. Each fixture is mounted within a die set, and rollers on the bed of the press facilitate installation and removal of the entire assembly. The punch has a ball and socket adaptor so that a flat surface is the only contact with the ram. Assemblies, with loose rivets in place, are easy to load because the tooling rotates and pivots. Pressure pads on the top tooling clamp the parts, and the rivets swage into any slight misalignment of the assembly to get a tight fit. Rivets used are standard commercial round head type.

Le Roi *Announces*

the V-8 H-540

A New, 200 H.P. Truck Engine



. . . with advanced design that gives greater economy, smoother operation, longer life

Here it is at last—a modern, high-compression, V-8 engine for heavy-duty trucks. Designed and built by Le Roi—the pioneer manufacturer of engines for heavy-duty service. Years ahead! These features show why:

★Modern V-8, high-compression, valve-in-head design!

★207 horsepower — speed range, 800 to 3200 RPM

★Most compact engine in its horsepower range — overall length only 43"!

★Lowest weight to horsepower ratio in the industry — only 6 lbs. per HP!

★Smoother running engine at all speeds — extra rigidity of short box-like crankcase and five large main bearings reduce vibration!

★Faster acceleration — quick response results from short stroke, light flywheel, and 8-cylinder power impulses!

★Good high-speed performance — large bore and short stroke provide ample valve area. Unique combustion chamber shape having ample quench area retards detonation!

★Extra protection — engine is safeguarded by full-flow by-pass filters that keep the oil clean!

These are only a few of many features that make the H-540 the most outstanding engine there is for heavy-duty trucks — that give you better performance and lower operating costs. Get all the facts — send coupon today for the H-540 catalog.

Condensed H-540 Specifications

Number of cylinders	8
Bore and stroke, inches	4½ x 4¼
Displacement, cubic inches	540
Horsepower, rated at rpm	207/3000
Weight as illustrated, lbs.	1250

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Plants: Milwaukee • Cleveland • Greenwich, Ohio

Here's your chance to see
the amazing new H-540
Visit us at the
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January 31-February 4
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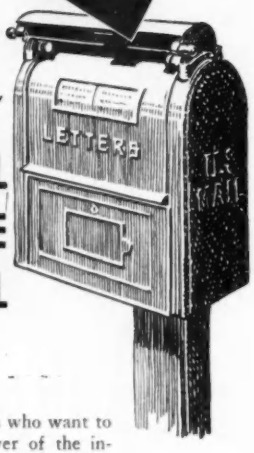

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AUTOMOTIVE HEADQUARTERS

What's Ahead

(*Continued from page 34*)

for buses and replacement parts amount to more than a quarter million dollars.

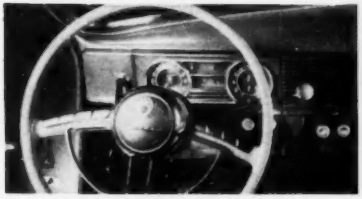
As was true in the last war, however, the large companies while holding the prime contracts will be dependent upon hundreds of suppliers for materials and components. Many automotive suppliers already have contracts for parts as have other industries which supply the automotive producers, such as the steel, rubber, and metal fabricating industries. Hundreds of contracts already have been let covering such items as batteries, tires, all types of metal fasteners, complete engines and engine assemblies, gears, engine parts, gaskets, truck bodies, electrical equipment such as generators and lamps, insulators, mufflers, screw products, bearings, hoists and winches, repair kits, and hundreds of other items.

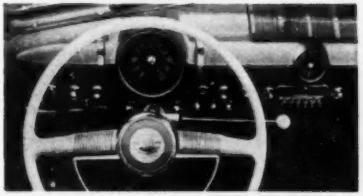
In addition to their major contracts, Ford, GM, and Chrysler also have sizable orders for passenger cars, replacement parts, batteries, and other automotive items required by the military. The procurement program has been stepped up rapidly in recent weeks and in one seven-day period during late December orders granted to automotive and supplier companies totaled more than $41 million. It is true that in most cases it will be many months before projects can be tooled and put into volume production, but it is already evident that the defense program is going to bite rather heavily into materials and manpower.

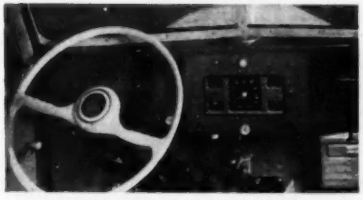
Of the major defense contracts granted to the industry thus far only one will result in complete conversion of a plant from automobiles to war goods—GM's B-O-P plant at Kansas City which will be used to build fighter planes. In fact, the dispersal program being followed by the military indicates that disruption of automobile plants for major assembly jobs will not be as widespread as it was in World War II. General Motors' tank project will be carried on at a Government plant in Cleveland, Ford will build aircraft engines at the Tucker plant in Chicago, and Chrysler will build a new plant at Newark, Del., for its medium tank order. Kaiser-Frazer is expected to get a contract for building cargo ships at Willow Run, but plans to carry on automobile production at the same time. GMC Truck & Coach also has ample facilities to carry on civilian truck production in its Pontiac plant while filling its $100 million military truck order. The Fruehauf contract for 35,000 all-purpose trailers will be centered at the company's Avon Lake, Ohio, plant but the company still will have adequate facilities to build trailers for essential civilian needs.

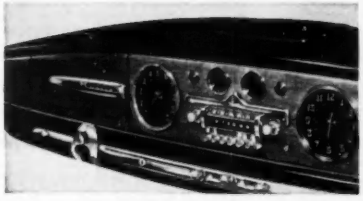
Evidence accumulates that the government is working toward a Con-

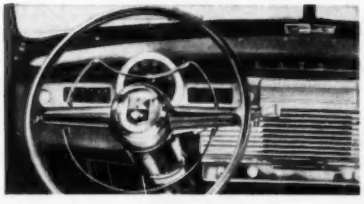
(*Turn to page 142, please*)











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KS **DASHBOARD INSTRUMENTS**

King-Seeley electric dashboard instruments have long been superior in the automotive field because:

1. Their performance is always reliable—gives the car owner no cause for a gripe.

2. All connections are made with standard electric wire, thus they are easily installed by production line methods.

3. No tubing is needed. Wires are used instead. Consequently the danger and annoyance of broken tubes are eliminated. No tubing holes in the dash. Engine noises cannot be telegraphed to the dash as they are by tubing.

4. The vehicle manufacturer can always depend on strict adherence to the delivery schedules of King-Seeley instruments.

5. King-Seeley research engineers are constantly searching for a way to improve the effectiveness, dependability, and economy of these instruments.

In the last seventeen years 50,000,000 K-S instruments have been installed in automobiles and trucks. For more detailed information, write to King-Seeley or ask for a representative to call.

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Widely used by leading builders of cars, trucks, buses and tractors, Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry.

AUTOMOTIVE IGNITION SWITCHES

Original equipment on many popular make vehicles, Mitchell ignition switches are noted for extra long life. "Radio" position at no extra cost.

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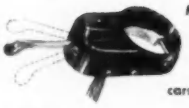
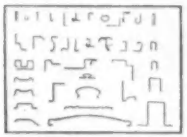
Semi- automatic, self-cancelling. Afford drivers easy, positive way to indicate turns to approaching and following traffic as well as to pedestrians.



Mitchell clamp-on and screw-type semi-automatic turn signal switch for trucks, cars, buses, tractors.

Mitchell 6-wire concentric-type semi-automatic turn signal switch used in passenger cars.



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Ignition and Turn Signal Switches • Rolled Shapes • Dovetails

UNITED AIR CLEANER DIVISION CHICAGO 28

Air Cleaners • Metal Stampings

trolled Materials Plan similar to that existing at the end of World War II. Reports that allotments of steel by the steel mills will be cut quite sharply in February, on sheet and strip particularly, lends weight to the belief that CMP soon will be back. The cutbacks on mill allotments of sheet and strip are due to the necessity of converting many mills to production of plate required by the defense program.

Although shortages exist for about 30 metals and materials used in automobiles with several of them already under restrictions, steel still is the prime determining factor for automobile production this year. An interesting point here is that steel capacity since the end of the war has been increased so that 100 million tons could be turned out this year. In 1944 at the height of war production, total military demand for steel was 35 million tons a year and if the defense program this year is no greater than it was at the peak of the war there could still be nearly 65 million tons left for civilian production. Actually, there is no indication in Washington or anywhere else as to what steel requirements will be, all of which adds to the confusion. Also there is a different situation today than existed at the start of World War II, when it was necessary to build a large number of new plants practically all of which are available for arms production. Likewise, it will not be necessary to build almost an entire Navy, a project which took eight million tons of steel during the last war.

Materials under restriction already include tin, nickel, aluminum, copper, zinc, cobalt, rubber, and cadmium. Steel as yet has not been put under restrictive orders but the industry is expecting that it will be in the near future in one form or another. Copper probably is the most critical for which to find a substitute and the belief is that it will be either copper or steel which will set the limit on production. There has been a report that copper will soon be cut back to 35 per cent of the base period which would be a severe blow. Nonetheless, the well known ingenuity of the industry constantly is being applied in an attempt to find alternate materials and methods of getting around the shortages. However, it still will be some time before the full effect of the restrictive orders on scarce materials will be known.

All indications point to a resumption this year of the bonanza market enjoyed by dealers during the immediate postwar years. Scarce buying of cars already had started in December with all companies reporting a pickup in sales. Oldsmobile during the second ten days of that month rang up an all-time record for any ten-day period in the company's history. Kaiser-Frazer, which had been hard hit following imposition of Regulation W, sold more than 18,000 cars to its dealers in December, the highest for any similar

(*Turn to page* 144, *please*)

5 Important reasons why Pheoll SCREWS-BOLTS-NUTS Produce More Profit for You

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INSURE PRODUCT PERFORMANCE with Pheoll quality screws, bolts and nuts—standardize on these dependable industrial fasteners.

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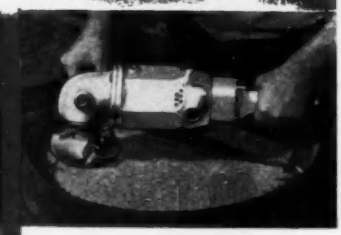
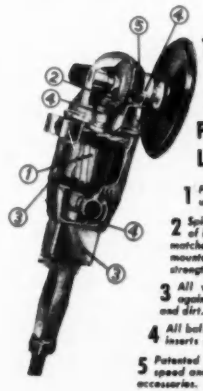
WIRE BRUSHING . . . *With "Whirlwind" Wire Cup Brushes, B&D Sanders zip off paint, rust, scale; clean castings, tanks, boilers, sheet metal and soldered joints.*



WOOD PLANING . . . *With rotary gouging and planing heads, B&D Sanders quickly shape and semi-finish lumber; remove stencil and brand marks from barrels and boxes.*



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1 *Full-power B&D universal motor.*

2 *Spiral beveled gears of heat-treated alloy; matched-lapped, spline-mounted for greater strength.*

3 *All vital parts sealed against abrasive dust and dirt.*

4 *All ball bearings on steel inserts and grease-sealed.*

5 *Patented spindle lock for speed and ease of changing accessories.*

BLACK & DECKER ELECTRIC SANDERS are fast, versatile, easy to handle, built to take it! You have your choice of four models—the 7″ Special Sander for intermittent service; the 7″ Standard for general purpose and the 7″ Heavy-Duty and 9″ Heavy-Duty models for more continuous work and greater output.

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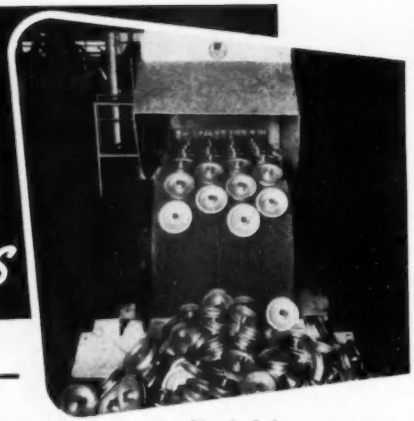

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A puzzling set screw problem on a new nationally known Washing Machine was successfully solved with ZIP-GRIP* Self-Locking Set Screws. In less than a year, over 100 manufacturers have adopted ZIP-GRIP* for the same reason. Perhaps ZIP-GRIP* is the answer to your puzzling set screw problems, too.

Send for Free ZIP-GRIP* Action Demonstrator that shows exclusive, Contra-Thrust Action; we'll also include ZIP-GRIP* Data Sheet and tell you how to get Free Engineering Test Samples. Write today.

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month in history. Retail sales were 272 per cent above the same month the previous year, and currently orders from dealers are exceeding production. The company now is not using any of the $25 million RFC loan granted to finance an inventory of the cars the company could not sell. About the only positive forecast any one in the industry will make is that vehicle makers this year will be able to sell every unit they can produce and that they will make every car and truck for which they can get the material.

One problem currently facing the industry is that of prices, which now are frozen at Dec. 1 levels by Government edict. Increases made after that date were based on greatly increased costs and with prices of materials and other items used in manufacture of vehicles uncontrolled and free to rise, the squeeze on profits is expected to get progressively tighter. The voluntarily price control requested by the government is not expected to work. Obviously, either all costs entering into production of cars will have to be frozen or vehicle prices will have to be adjusted upward. This is particularly true in view of the lowered volume of cars and trucks expected this year, thus increasing overhead costs. Another potential trouble spot is wages of automotive workers. The Government wage freeze extending until next March 1 is meaningless because most of the industry operates under cost-of-living contracts which would not permit a wage increase anyway until that time. The Government will have to take definite action on the escalator clauses in automotive labor contracts by March 1, and a ruling that cost-of-living provisions are frozen might result in some serious labor difficulties.

Despite unsettled conditions, major expansion programs in the industry are going ahead on schedule. These include the Ford engine plant and foundry at Cleveland, the new engine plant at the Rouge, the new Lincoln-Mercury assembly plant at Wayne, Mich., a steel stamping plant at Buffalo, the new Chrysler transmission plant at Indianapolis and a new engine plant at Trenton, Mich., and the new Buick engine plant at Flint. At the moment plans have not been changed to use these facilities for the activities originally planned, but it would not be too surprising if they should go directly into war work when completed.

Liquid Blasting Saves Die Polishing Time

(*Continued from page* 46)

fine detail work and hand polishing to be done *before* heat treating, while the metal is still soft, thus saving materially in the time required through the application of mechanized hydrofinish cleaning methods.

To help you get the most out of the steels you're getting

The rearmament program, even at this early stage, is packed with headaches for steel users. And that is true whether you are working on defense orders or on non-military requirements.

If **you are operating under DO priority ratings you will of course get first call on critical steels. The steels you need for government defense orders will somehow be made available, but—you will still be faced with the necessity of quickly making the most out of those steels. For military needs are pressing and promise to become more so.**

If **you are working on purely civilian goods, your problem is an even more difficult one. You will find it almost impossible to obtain certain steel items that are essential for defense. To fill the gap you will have to employ substitute steels. You'll need help not only in selecting the proper substitute steels, but in using them properly.**

We are prepared to assist you in either situation.

The steel engineers and metallurgists we have assigned to this important job of helping you use steel more *effectively* are the same men who were largely responsible for the development of National Emergency steels—one of the outstanding metallurgical accomplishments of World War II. These men can call upon the facilities of the most completely equipped steel research laboratories and the largest steel making plants in America. They can bring to the solution of your problems the very latest ideas and time-saving techniques in the working and treatment of steel. We urge you to draw freely upon this rich reservoir of experience.

UNITED STATES STEEL COMPANY, PITTSBURGH
COLUMBIA STEEL COMPANY, SAN FRANCISCO · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH — COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

1-306

UNITED STATES STEEL

Tractor Demand Heavy in '51

(*Continued from page 43*)

one to the other as desired, will make its debut next month.

Except for the continuing demand for the larger sizes of farm tractors, last year presented two striking contrasts in sales. During the first half, farmers' purchases were well below the levels of 1949. The industry apparently was in a buyers' market, and retailers were not sufficiently prepared to sell. This trend, however, was suddenly reversed with Korean developments, when a spontaneous wave of panic buying appeared throughout the country. The result was that more tractors were sold in July than ever before in a single month. By mid-August the panic factor disappeared and sales leveled off but on a much higher plateau.

Export sales showed the expected decline during 1950, due primarily to an increasing shortage of American dollars in the major importing countries. At the same time tractor plants throughout western Europe attained a higher state of rehabilitation, partly through ECA funds, and not only have supplied a greater part of the market in Europe and in the British Commonwealth nations, but because of the pound's devaluation have increased their share of the trade in the Latin-American countries. During 1950 steps were taken toward the establishment of a company in England which will manufacture a large tracklaying tractor to compete with American producers, formerly the only source of supply. A company, formerly identified with an American manufacturer, has taken over its distribution.

PAGE WIRE

LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

ROUND
FLAT
OR
SHAPED

You draw the Shape
—Page can draw the Wire

—the way you want it for your production—whether it's ALL of your product, or only a part.

Cross-sectional areas up to .250" square; widths to ⅜"; width-to-thickness ratio not exceeding 6 to 1.

for Wire or Information about Wire—

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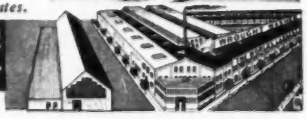
Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*



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French & Hecht Davenport, Iowa Plant

SERVING AMERICAN AGRICULTURE!

Wheels, Hubs, Axles, Parts for Farm Equipment

One of 7 Great Plants Specializing in Farm and Automotive Products

For more than 60 years specialists of French & Hecht Division have been serving manufacturers in the devising and proving of quality wheels and related parts for most every conceivable type of agricultural implement and industrial wheeled equipment! Complete railroad baggage trucks and other contract items also produced.

To determine what is best for you, designers and engineers consider the material, type of wheel, hub, axle, bearing, and tire size to meet your requirements of load range, side strains and operating speeds under conditions of actual use.

K-H ... ASSURES PROVEN PRODUCTS AT ...

KELSEY-HAYES WHEEL COMPANY

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PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.

PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

Announcing

MIDLAND'S *New* AIR HAND CONTROL VALVE

1 - *STREAMLINED*

2 - *MORE COMPACT*

3 - *INTEGRAL BRACKET*

4 - *EYE APPEAL*

5 - *FINER METERING*

6 - *POSITIVE FULL "OFF OR ON" HANDLE POSITION*

7 - *LONGER AND MORE STURDY HANDLE*

8 - *NEATER INSTALLATION — PIPING SNUG TO STEERING COLUMN*

9 - *NEW DESIGN RESULTING IN INFREQUENT, ECONOMICAL SERVICE*

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STEEL PRODUCTS COMPANY

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Furnishing safe power for MIDLAND Air Brakes is the sturdy MIDLAND Air Compressor — each unit undergoing rigid test to prove its performance

Recent MIDLAND Contributions to Brake and Related Controls

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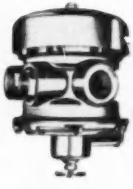
MODERN DESIGN BUS DOOR SAFETY CONTROLS

NEW AIR HY-POWER "AIR-OVER HYDRAULIC" IN ITS SIMPLEST FORM

NEW IMPROVED VACUUM HAND CONTROL VALVE "EYE APPEAL"

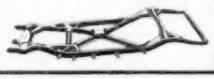


NEW ELECTRO-PNEUMATIC DOOR CONTROL VALVE AND CYLINDER ASSEMBLY

NEW VACUUM EMERGENCY RELAY VALVE, CHECK VALVE AND MOISTURE TRAP ASSEMBLY

Air and Vacuum POWER BRAKES

World's Largest Manufacturer of AUTOMOBILE and TRUCK FRAMES



Air and Electro-Pneumatic DOOR CONTROLS

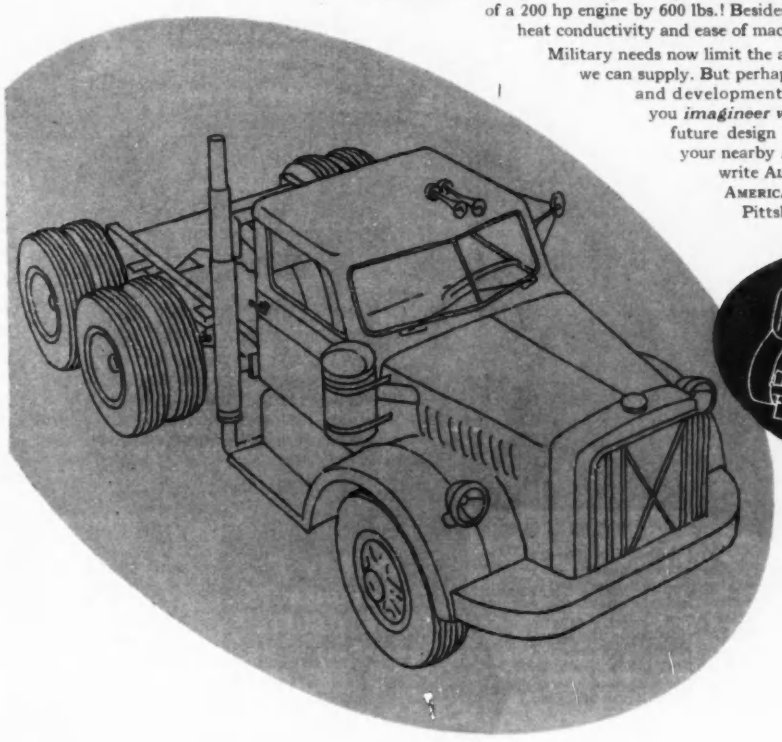
Imagineering WITH ALUMINUM

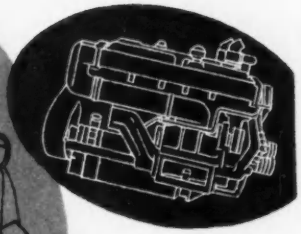
makes Diesels 25% lighter

Engine designers have blasted the idea that transportation diesels are heavyweights. Lightweight diesels already have proved themselves in the bus transportation field. Now the lightweight giant is moving into the truck-trailer field. It has been done by imagineering with aluminum!

They've found that half the parts (by weight) of an average transportation diesel engine can utilize aluminum to advantage. Every pound of aluminum saves a pound of engine weight. Aluminum can trim the weight of a 200 hp engine by 600 lbs.! Besides it offers bonuses in heat conductivity and ease of machining.

Military needs now limit the amount of aluminum we can supply. But perhaps our technical men and development facilities can help you *imagineer with aluminum* for future design improvements. Call your nearby Alcoa sales office. Or write ALUMINUM COMPANY OF AMERICA, 1841A Gulf Bldg., Pittsburgh 19, Penna.





Diesel Engine Builders have used Aluminum successfully for these parts

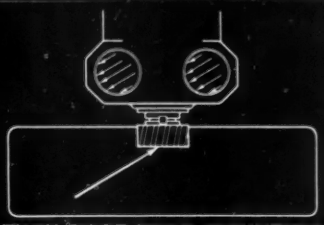
Crankcase
Main Bearing Caps
Cylinder Block
Cylinder Head
Intake Manifold
Flywheel Housing
Oil Pan • Oil Pumps
Timing Gears
Timing Gear Cover
Fuel Pump Body
Supercharger Housing
Supercharger Rotors
Cylinder Head Cover
Pistons • Push Rods
Rocker Arms • Fan
Miscellaneous Covers and Brackets

ALCOA

ALCOA ALUMINUM

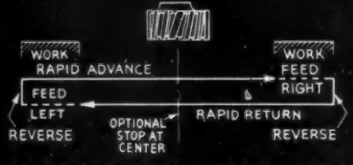
First in Aluminum

KENT-OWENS *Plus Features* Give You *PLUS PRODUCTION!*



TWIN POST HEAD MOUNTING

Head mounted on two cylindrical ground steel posts which carry spindle midway between them—an *exclusive Kent-Owens feature!* No overhang.



WIDE RANGE OF AUTOMATIC CYCLES

Hydraulic feed used on all Kent-Owens power feed machines. Wide range of automatic cycles available including intermittent milling, etc. Independent feed rate for both directions of table travel permits doing entirely different operations at opposite ends of table.

You'll find Kent-Owens Milling Machines the cost-cutting answer to a wide range of milling jobs! They're *rugged, simple, versatile* . . . with practical features that reduce machining time . . . save labor . . . and maintain high precision. Write for bulletins on the Kent-Owens Standard line . . . including wide range of hydraulic and hand operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

Call on

KENT-OWENS

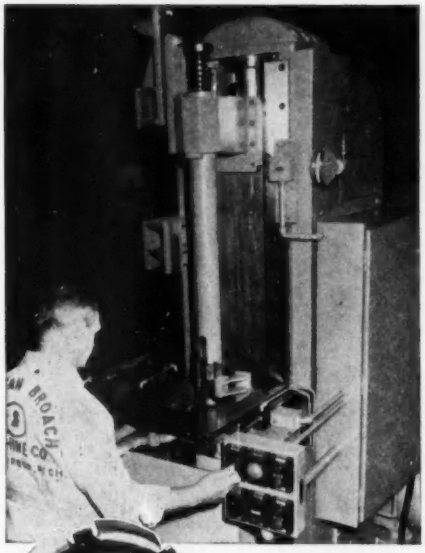
for Milling Machines

ONLY TWO GEAR CONTACTS ... MOTOR TO CUTTER

Drive is unusually simple and direct, being taken from a standard foot mounted ball bearing motor at rear of machine. Wide range of spindle speeds by changing pick-off gears.

Fixed broaches + automatic cycle } = HIGH PRODUCTION

by broaching the *American* way



PROBLEM To broach six external lugs on a stamped transmission clutch flange part in one pass.
(The previous broaching set-up consisted of three fixed broaches on the machine slide, a receding table and an indexing type fixture. Three lugs were broached in one pass, the table receded, the fixture indexed 180° and the opposite three lugs broached. This did not meet production requirements nor accuracy as the receding table and index fixture allowed too great an accumulation of error.)

SOLUTION A special American 10 ton, 42 inch stroke vertical broaching machine arranged to push the part past six stationary roughing broaches in one pot which nibble and adjustable finishing broaches in the second pot which shave the part. A 3 to 4 times hourly production increase with the part held within the tolerance was the results of this ENGINEERED PRODUCTION broaching operation by American.

OPERATING CYCLE: The operator first loads a part and starts the automatic machine cycle with dual push buttons. The transfer slide moves forward to broaching position and automatically starts the main ram down. Fastened to the ram is a push bar which locates the part and pushes it through the stationary broaches. The part is automatically discharged at the end of the stroke. The automatic transfer slide returns to loading position allowing the operator to reload while the push bar is returning up.

American can give you this Greater Production Economy

This is only one example of how broaching the American-way solved this manufacturer's problems. Because American manufactures a complete line of broaches, broaching machines and fixtures, they can help you engineer your job *completely* to obtain the greatest production economy. Start American working for you by sending a part print or sample and your hourly requirements.

Write for Circular 300 showing American's complete line of hydraulic surface broaching machines.

AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

What's good grooming for a golf shaft?

...*a brush!* Prior to plating, golf shafts must be perfectly clean, free of heat-treat discoloration and surface imperfections. In cleaning and finishing, the problem was to get into the corners of the tapered True Temper "step-down" and to do the job in one pass at high speed.

The problem was solved with a five-station, in-line automatic machine equipped with Osborn Fascut® Brushes. This automatic brushing gives the shafts a smooth, uniform finish over the entire surface . . . and it has increased output 20% over the former method.

Perhaps new Osborn brushes and brushing techniques can improve *your* products and step up your productivity. An **O**sborn **B**rushing **A**nalyst will gladly survey your operations. Write today for an **OBA!** *The Osborn Manufacturing Company, Dept. 394, 5401 Hamilton Ave., Cleveland 14, Ohio.*

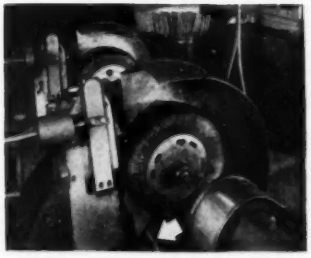
OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS

Osborn Brushes step up finishing output 20%

The problem here was to remove heat-treat discoloration and surface imperfections from golf shafts prior to plating. Due to the tapered True Temper "step-down" design of the shaft, it was difficult to get into the "step-down" corners with the former method. Two or three passes were required for thorough cleaning.

Now, with the five-station machine shown above, Osborn Fascut® Brushes, with compound, finish the shafts in one pass, netting a 20% increase in output. Uniform quality of finish over the entire surface is duplicated accurately from piece to piece due to the ability of the Fascut Brushes to blend with the exact contour of the golf shafts.

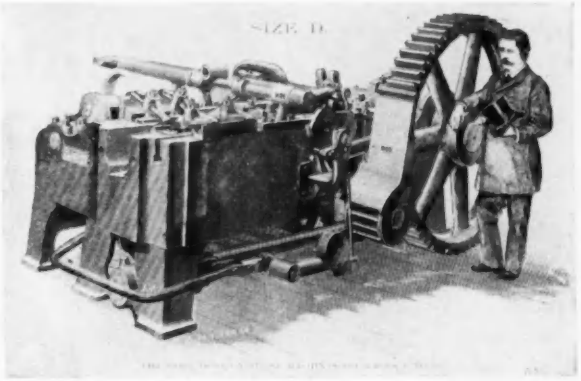


Brushes run at 900 rpm. Output of the machine is 1500 shafts per 8 hours or about 10 feet of shaft per minute.

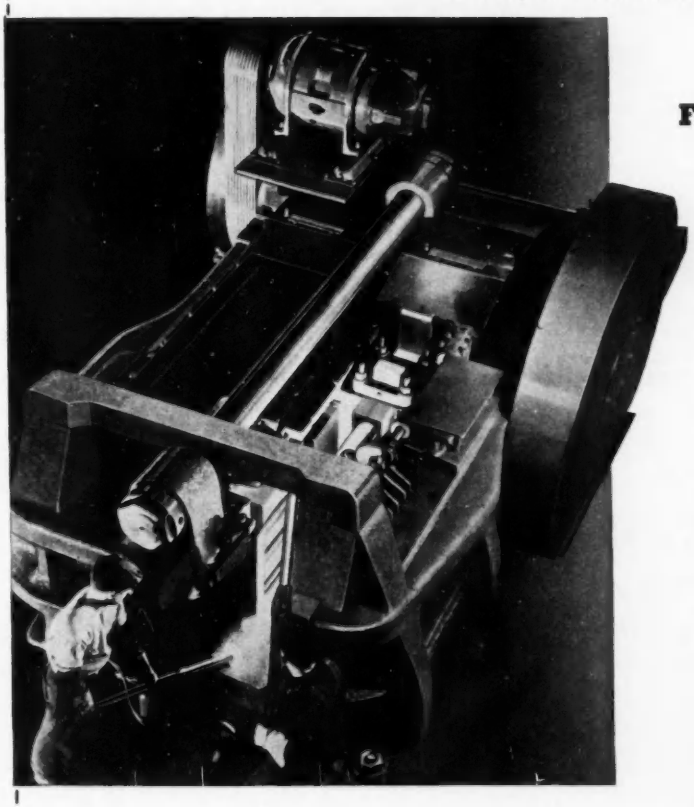
If your production problem involves finishing or cleaning of parts, an **O**sborn **B**rushing **A**nalysis most likely will demonstrate how this work can be done more efficiently . . . at less cost with new, improved power brushing techniques. Call or write Osborn for this service. There is no obligation.

IN 1890

The largest forging machine weighed 40,000 pounds. With cast iron crankshaft and cast iron bed, the finest materials available, the 5″ Blakeslee Forging Machine was the quality machine of its day.



Mr. J. R. Blakeslee, founder of the Blakeslee Machine Co. (AJAX since 1894) stands beside the first 5″ Forging Machine. Patented in 1889.



FOR 60 YEARS

The urgent demands of industry in War and Peace, the supreme achievement of engineering skill, the use of the best materials have produced a superior product geared to the needs of the times. AJAX Forging Machines have excelled in performance throughout the years.

Today—

For excellence in design, performance and durability in Forging Machinery... CHOOSE

AJAX

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The blueprint you send us for quotation—on any essential part or parts—may secure you a most dependable source of supply.

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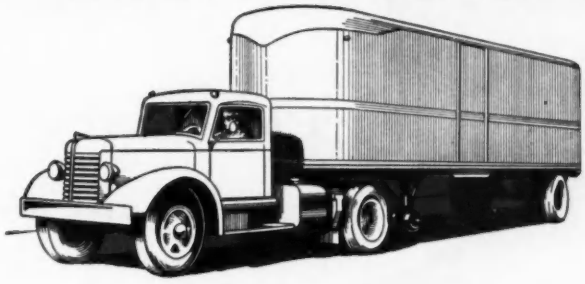
Mass Production of Precision Parts for More Than a Quarter Century

Haul 13,200,000 Pounds Extra PAYLOAD



Because the MECHANICS Roller Bearing UNIVERSAL JOINTS truck PROPELLER SHAFT is 28 pounds lighter than other joints and shafts of comparable torque capacity, MECHANICS equipped trucks carry 13,200,000 extra pounds payload during the average truck life of 400,000 miles. Let our engineers help add to the ton-mile capacity of *your trucks* by specifying weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS truck PROPELLER SHAFT applications.

MECHANICS UNIVERSAL JOINT DIVISION

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"I believe every company should . . ."

MR. CLARENCE FRANCIS

Chairman of the Board, General Foods Corporation

"I believe every company should conduct a person to person canvass right now, for the best way to promote the sale of U. S. Savings Bonds is to put an application card into each employee's hand and allow him to reach his own decision."

As one of America's top executive salesmen, Mr. Clarence Francis knows that you sell more when you "ask the man to buy." Naturally, that means a person to person canvass of *all* your employees, but it is not as difficult as it may sound. In fact, it is very simple:

Tell your employees personally—or over your signature—why the automatic purchase of Savings Bonds through the Payroll Savings Plan is good for them and their country.

Designate your Number One Man to organize the canvass and keep it moving.

Enlist the aid of employee organizations—they will be glad to cooperate with you.

With posters, leaflets, and payroll envelope enclosures remind your employees of the many benefits of the Payroll Savings Plan. Your State Director, U. S. Treasury Department, Savings Bonds Division, will furnish you, free of charge, all the promotional material you can use.

Be sure that every man and woman on the payroll is given a U. S. Savings Bond Application Form.

Thousands of companies, large and small, have just completed or are now conducting person to person canvasses. Their reports are a challenge to every company that does not have a Payroll Savings Plan . . . 50% employee participation . . . 60% employee participation—some of them have gone over 80%.

All the help you need to conduct your person to person canvass is available from your State Director, U. S. Treasury Department, Savings Bonds Division. Get in touch with him.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and

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FOREMOST IN
SCIENTIFIC DEVELOPMENT

IN THE REALM OF FORGING DESIGN AND THE DEVELOPMENT OF PROPER GRAIN-FLOW, WYMAN-GORDON HAS ORIGINATED MANY FORGING DESIGNS WHICH AT THE TIME OF THEIR DEVELOPMENT WERE CONSIDERED IMPOSSIBLE TO PRODUCE BY FORGING.

WYMAN-GORDON

ESTABLISHED 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

M. & M. DUPLEX MILLING AND CENTERING MACHINE
Part — automotive pinion
Operation — mill both ends and center drill
Production — 220 pieces per hour at 100%

FOR HIGHER PRODUCTION

Combine Operations

ON MOTCH & MERRYWEATHER SPECIAL MACHINES

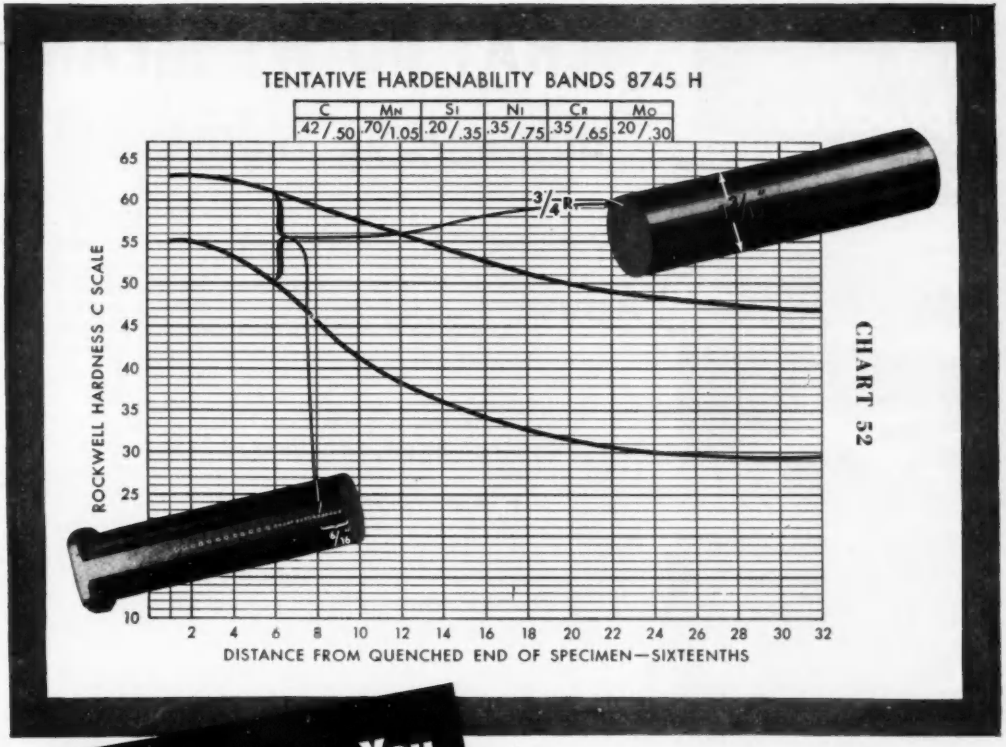
The Motch & Merryweather milling head features rigidity at the tool point.

You can be sure of getting higher production with lower cost per piece by using Motch & Merryweather machines designed for multiple operations. The machine pictured here mills and center drills a vast range of parts, some of which are shown in white above. Our representative will help you obtain thorough-going accuracy, together with *production, PRODUCTION,* and *MORE PRODUCTION.* Contact us *now.*

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



You Gain When You Order Alloy Steels To Hardenability

While many users buy alloy steels to chemical analysis, there is often a considerable saving involved when grades are ordered to hardenability instead.

When you order "H" steels specified by hardenability bands you eliminate top and bottom analysis extremes, thereby promoting uniformity. This provides definite advantages, as top extremes in hardenability frequently cause quenching cracks, and bottom levels may mean failure to obtain the needed effectiveness of quench.

For example, suppose you need a $1\frac{3}{16}$-in. round that will quench in oil to Rockwell C-50 minimum hardness at the three-quarter radius. (At this point, the hardness value is approximately equal to that of martensite.) Standard cooling rate curves for a mildly agitated oil-quench show the commensurate distance from the hardened end of the end-quench test to be $\frac{5}{16}$ in.

When this required distance is located on an established hardenability chart, such as the one reproduced above, we find that 8745 H analysis will produce 50 minimum and 61 maximum hardness. This indicates that 8745 H meets the requirements. The possibility of getting an 8745 type steel of greater or lesser hardenability is eliminated when the "H" steel is ordered.

Our metallurgists will gladly explain in detail the advantages and savings in ordering steels to hardenability. They will also help you with heat-treatment and machining problems.

We manufacture the entire range of AISI grades and special-analysis steels as well as carbon steels.

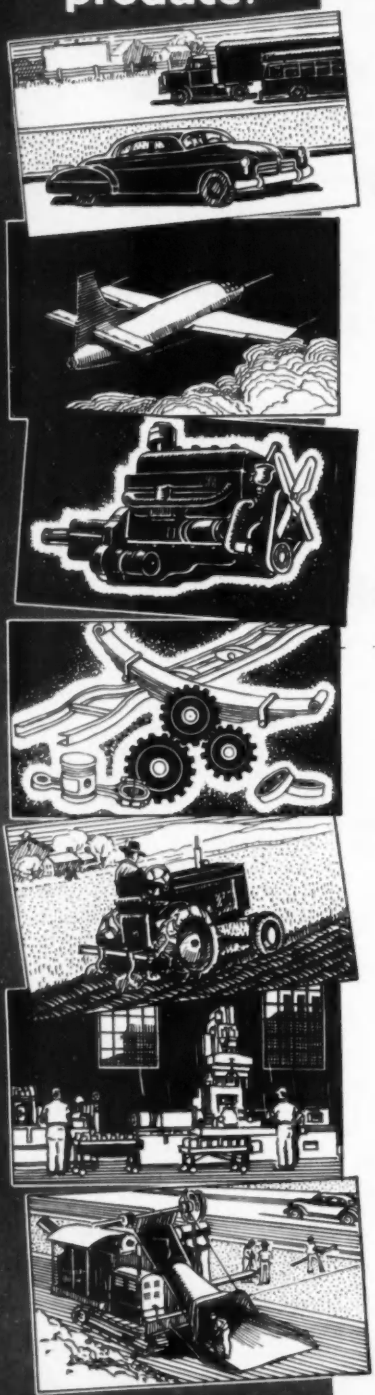
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation.

BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

The automotive industries produce:



WHAT DO WE MEAN "automotive industries?"

Answer: *The nation-wide industries that manufacture passenger cars, trucks, buses, tractors, gasoline, diesel and jet engines, aircraft parts, accessories, automotive materials, supplies and production equipment, farm and road-working equipment, petroleum products, automotive shop equipment.*

"AUTOMOBILE" INDUSTRY ONLY A PART

Often misinterpreted as the "automobile industry," the automotive industries include a much wider industrial field than the manufacture of passenger cars, a huge segment in itself. Over 4500 automotive manufacturing plants in 46 States comprise this active industrial field.

A $14 BILLION INDUSTRIAL FIELD

The automotive industries represent America's No. 1 industrial market . . . the largest consumer of thousands of products, such as parts, materials, supplies, machine tools, plant equipment and services . . . all purchased in vast quantities to keep production in step with today's unprecedented demands.

HOW TO REACH THIS VAST NATION-WIDE MARKET

AUTOMOTIVE INDUSTRIES is the ONE magazine that penetrates deeply into the automotive manufacturing field, presenting your sales message effectively to over 19,000 *proved* readers . . . the design, production, administrative and purchasing executives who comprise the buying teams of the automotive industries.

AUTOMOTIVE INDUSTRIES

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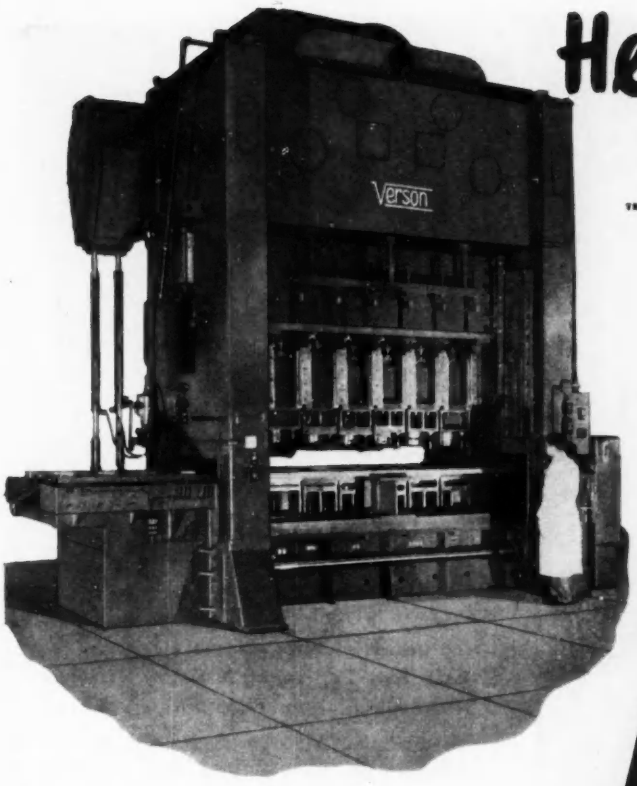
. . the industrial automotive NEWS MAGAZINE

Here's what



TRADE Verson MARK TRANSMAT PRESSES will do for you . . .

- ✓ Eliminate handling, pickling, and annealing between operations
- ✓ Provide greater uniformity
- ✓ Minimize rejects
- ✓ Conserve floor space
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Illustrated is a 250 ton Verson TRANSMAT Press used by a leading manufacturer of automotive parts for making sealed beam headlight mounting rings. Developed blanks are fed by a Verson Automatic Stack Feed and six operations are performed. Production is 1100 pieces per hour.

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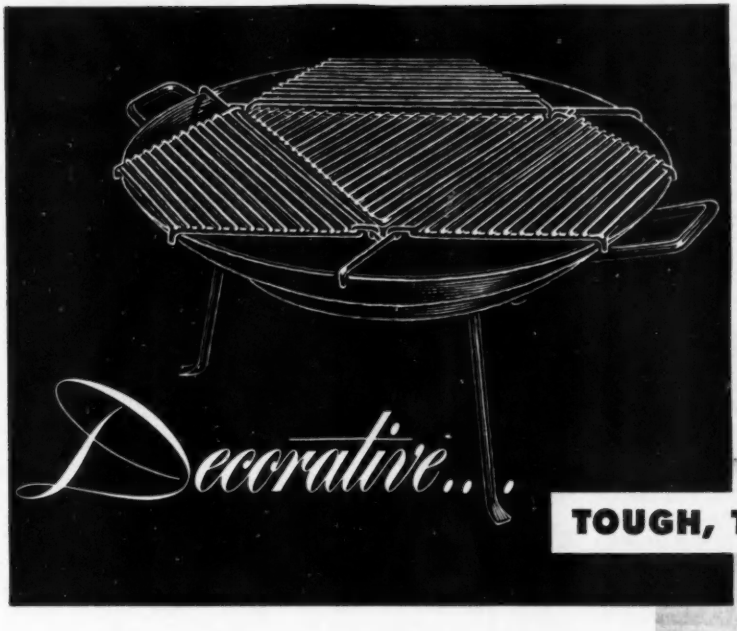

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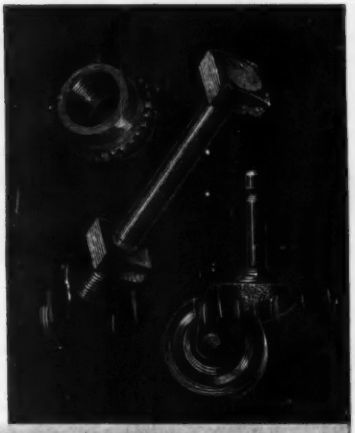

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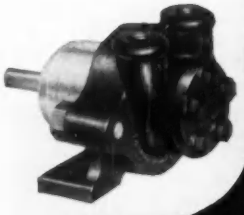

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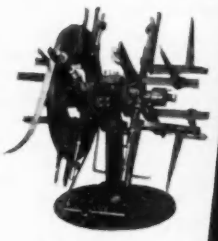

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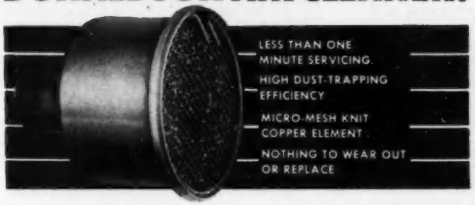
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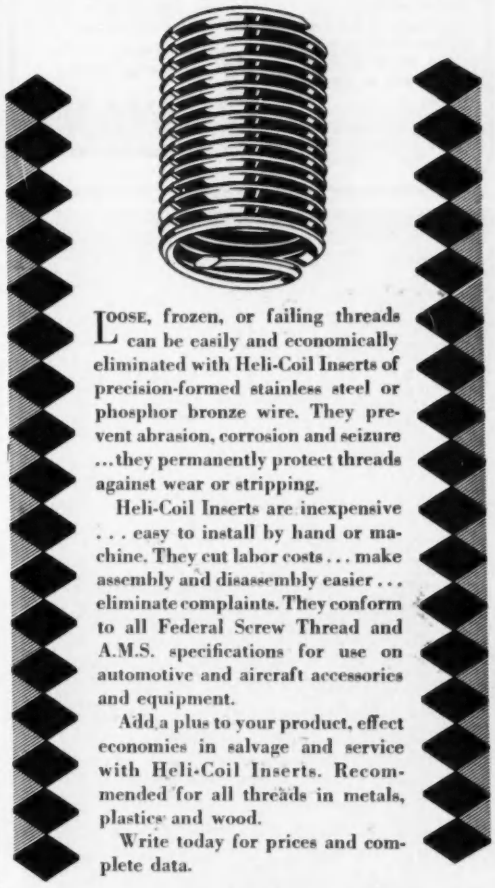

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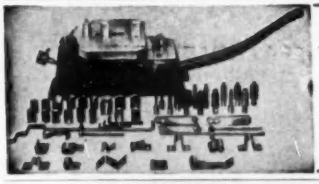

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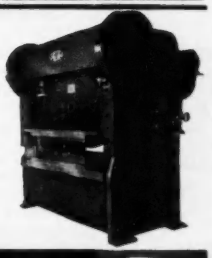

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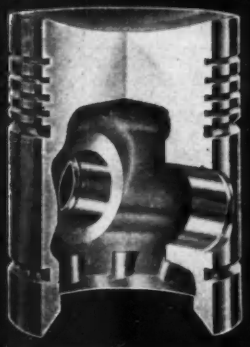

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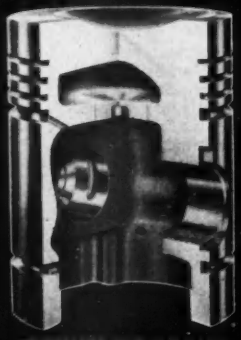

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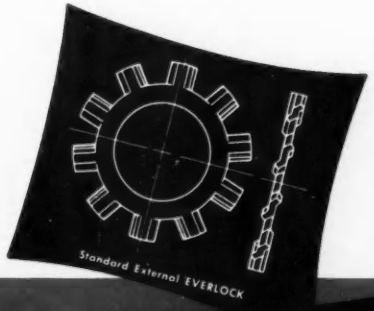
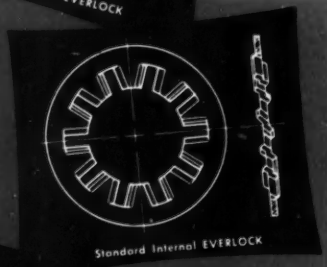
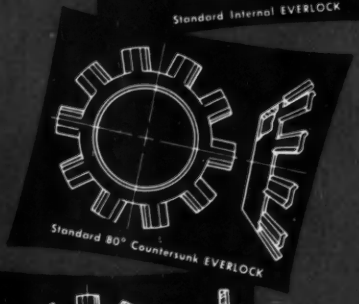
Everlock

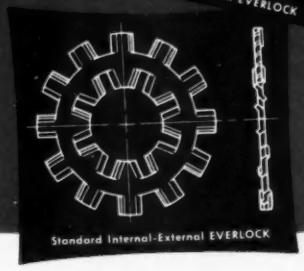
"CHISEL EDGE" LOCK WASHER

QUALITY









Safeguards your assemblies under vibration, expansion, contraction or strain

QUALITY of design and manufacture of Everlock Washers can be measured in only one term . . . the degree to which they safeguard the *quality* of the product *you* make. Only so long as they protect your assemblies against damaging vibration, expansion, contraction and strain . . . can their quality be termed "tops."

FOR YEARS, the automotive industry and other leading manufacturers in almost every field have looked to Everlock to safeguard the quality of their products. Everlock's alternating chisel edges forced into faces of both work and nut provide perfect 2-way locking action. Four standard types shown here meet most lock washer needs.

BUT . . . if you need special types to fill a particular need, call on Everlock *first*. You'll get prompt service for *all* your washer needs . . . to your most exacting specifications.

When ordering screw-washer assemblies from screw manufacturers specify Everlock washers for quality and fast service.

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It's off the press! It's YOURS . . . FREE! It gives complete specifications on every **Everlock** *Washer. Find out now how* **Everlock** *can help you safeguard the quality of the product you make. Write for new 1950 catalog today.*

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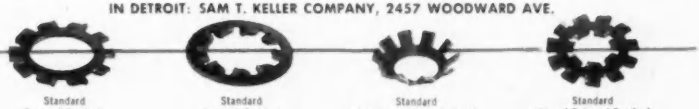
THERE'S AN Everlock LOCK WASHER FOR EVERY NEED



Standard External Everlock | Standard Internal Everlock | Standard 80° Countersunk Everlock | Standard Internal-External Everlock

the washer that has the edge

Which comes first—style or comfort?

IF you're just talking about getting a customer in the front door, that's one thing.

But if you want to keep the door locked and barred behind him so he stays your customer for life then the answer is: "*neither* style *nor* comfort"!

What keeps customers coming back again and again is "value"!

From now on motorists are going to be more and more conscious of value. Especially where it counts most—in moving parts, the "vital zone".

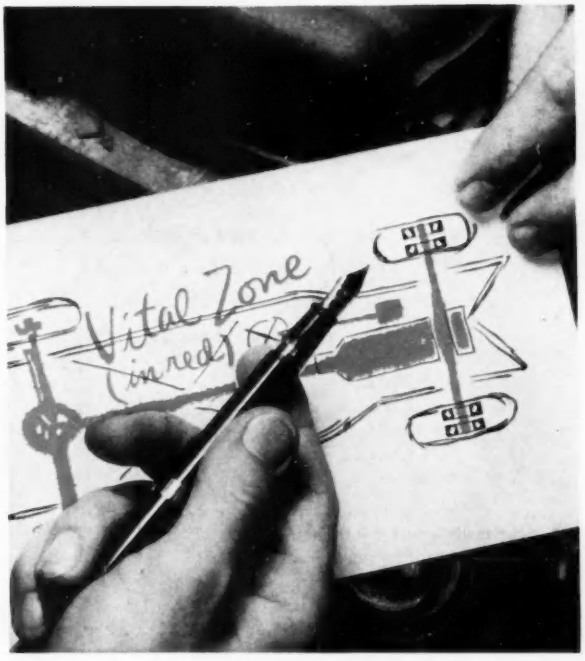
And a helpful step toward getting top value where it counts most is to keep this simple formula in mind when buying "vital zone" parts:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

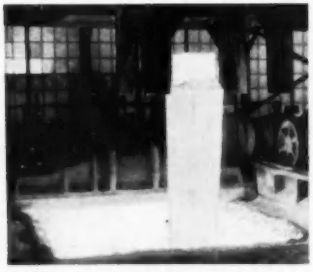
Obviously a *big* advantage *above* the line will give you more value than a *small* one below the line. By this formula, or any other, your best value in tapered roller bearings for front wheel or any other application is Timken®.

No other bearing can match Timken's uniform high quality, extensive service help and overwhelming public acceptance.

In terms of value features, Timken prices are the lowest today! The Timken Roller Bearing Company, Canton 6, Ohio.



How TIMKEN® gives you value where it counts most . . . in the "vital zone":



WE MAKE OUR OWN STEEL—because it is the only way we can get the consistently high quality steel required for Timken bearings. And because it gives us quality control from start to finish. Timken is the only bearing manufacturer in America that makes its own steel.

PROOF OF THE PREFERENCE for Timken bearings where value counts most is the fact that all but two cars use Timken bearings in the pinion—toughest bearing job in the car. Over the years Timken value has proved itself again and again in every application throughout the "vital zone".

ONLY TIMKEN GIVES YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. 50 years experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

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